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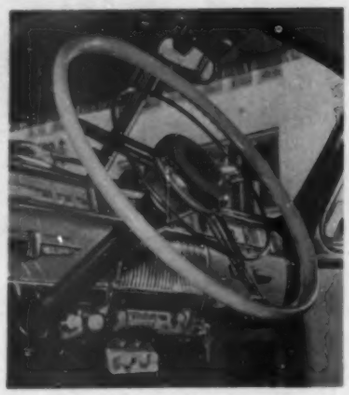
modern plastics



OCTOBER 1940

VOLUME 18 NUMBER 2

NOVEMBER

The automotive industry, probably the largest consumer of plastics annually, goes on parade next month from coast to coast with its 1941 crop. Our November issue will describe and picture the increasing contributions of plastics in the new models—ranging from steering wheels, knobs, and colorful instrument panels to the all-essential mechanism under the hood.

In addition, we have scheduled the first authoritative, complete report of the development and applications of Vinylidene Chloride, the new extruded plastic material that has joined the rapidly growing ranks of versatile synthetic organic fibers.

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MODERN PLASTICS
WILLIAM T. CRUSE, Editor

OCTOBER, 1940 VOLUME 18 NUMBER 2

THE FIFTH ANNUAL MODERN PLASTICS COMPETITION—1940

While the growth of the plastics industry has been phenomenal as evidenced by the scores of applications encountered every day there is no project which more graphically depicts the progress of the industry than the Annual Modern Plastics Competition. A classic illustration, the Fifth Annual Competition, with entries from all sections of the country representing many branches of industry, with every conceivable type and class of application, is a really impressive representation of the industry's development during 1940. The Competition dramatically presents to the public the ingenuity of the chemists who are responsible for the basic raw materials; demonstrates the capabilities of the molders, laminators and fabricators who give the materials their form; and brings to light the talent, skill and art of the engineers and designers whose labors are an essential and integral part of every successful plastics product that reaches the market.

Approximately 1000 entries this year, with a veritable host of new materials to serve the industry's ever expanding horizons, proclaim 1940's developments. Many of these include entirely new plastics which are taking a prominent position along with the tried, established types.

The year has witnessed the commercial arrival of more new raw materials than any time since the year John Hyatt originated Celluloid. Cellulose acetate butyrate, styrene resins, vinyl resins, vinylidene chloride, nylon, have come forward in a major way. Not until this year have these plastics, many of them long cradled in the chemists' test tube, been revealed in actual applications—and their immense potentialities can scarcely be estimated at this time.

It was an interesting experience to accompany the judges whose duty it was to select from the host of entries those which typified progressive advances in the plastics industry. It was particularly gratifying to see how they, in their impartial decisions, selected those developments which were truly representative of technical, scientific or industrial advances. It would be a superhuman undertaking to state arbitrarily that these awards are those which represented the only important advances or hold the greatest economic promise. On the other hand it is a relatively simple task to select and enumerate a group that characterizes the Fifth Annual Competition, the ones that give it distinction.

From an electrical point of view one of the most important developments has been the more extensive use of molded polystyrene. While this material heretofore has been used extensively in Europe it has only recently assumed major importance in the United States. Ideal where inert chemical stability is desirable, it serves as well where moisture resistance is a factor. Besides the use of styrene for small, intricate, delicate

Candid camera snapshots on these pages reveal the six judges of the 1940 Competition hard at work at the task of selecting winners from a host of remarkable plastic achievements. The board included Alfred Auerbach, Harvey Wiley Corbett, William A. Kimbel, M. W. Petrie (pinch-hitting for A. W. Swigert), Morris Sanders and Harold Van Doren. Intent, thorough examinations were made of each group and merits of entries carefully weighed before gathering items for consideration. Members of MODERN PLASTICS staff trailed along, interested spectators as keen discussion and expert opinions bounded in all directions before the judges made up their final ballots around the conference table

electrical parts, styrene has made its debut in the aircraft industry in a large, injection molded instrument panel for small aircraft.

By leaps and bounds, vinyl ester resins have marched into a number of new fields this year. New forms derived from this basic class of resins have been developed, of which a highly plasticized vinyl material is the most significant. In sheet and extruded form particularly, the vinyl has stepped into the apparel field to replace fabric and leather and rubberized textiles. In the shoe industry alone, the plastic is holding its own in the higher price brackets. An impressive assortment of water-resistant garments for men and women, as well as belts, garters and suspenders step out on the fashion front.

While the number of entries using vinylidene chloride were limited, one which commands attention is its application as a fishing line leader. A thin extruded length of the material serves the purpose well. In the field this is an unique innovation and a new departure. It denotes in a preliminary way the possibilities which are around the corner. This material also is scheduled to enter the furniture field to replace reed and rattan. In fact, we are told that subway strap hangers will find plastics covering the seats on New York's latest underground railway. The potentialities of this material are being exhaustively researched.

Of the plastic materials which have flourished through the year, probably none has prospered more than cellulose acetate butyrate. It has gone ahead in business machines as evidenced in an entry where it is used as a housing for a billing register; in furniture, where, in extruded form, it is woven, like cane, into attractive chair backs and seats and translucent screens. It trims complete bedroom and dining room suites; in sporting goods, a football helmet shows how it may be made into forms to fit a variety of appropriate purposes. There are other exhibits too which indicate the remarkable progress of the aceto butyrate. An automobile instrument panel incorporates a number of parts that are injected from this material, designed to fit into the general scheme of the car's styled interior where other parts are found made of the same plastic.

Nylon, already a household word to the fashion-conscious women of America, has come into its own in the industrial sphere. Not in the form of thin fibers, for toothbrushes, fishing lines or sheer hose, but as bristles for brushes used in industry, where the utmost in sturdy rugged characteristics is necessary. This is the likely forerunner of more developments to come in this material which will undoubtedly be shown at succeeding competitions.

We must not be misled into believing that the phenolics, ureas and cellulose acetates did not make a showing. These materials have become such an important and integral part of our everyday life that we sometimes fail to give full recognition to them. Because these materials, relatively speaking, are "old," the uses to which they are put and the advances they make from one year to another may not seem so spectacular as those of the newer types of plastics. However, the fact that phenolics, ureas and cellulose acetates are continuing to replace metals and other materials, and the fact that they are constantly making inroads into new fields, demand recognition.

Consider the phenolics, for example. Among the many new uses found for this type of plastic are shuffleboard disks. Subject to all sorts of weather, from storms at sea, to rain and the salt spray on the seashore, these disks were developed to eliminate the

splitting, breakage and warpage so common to those made of wood. Now, phenolic materials have come to the rescue to give added life and better performance to the disks when in play.

Always a friend to industry, the phenolics have again made many contributions to the electrical and mechanical fields. Molded plastic solder paddles, used to smooth solder in the automobile industry, replace the wooden types formerly employed. These paddles come in various shapes and have fountain handles to hold the lubricating oil. Thanks to plastics—they will withstand the high temperature of softened lead and will not become scored with use.

The ureas are finding wide use in the field of fluorescent lighting. This division of the lighting industry, though comparatively new and still very much in the experimental stage, is opening up new channels for plastics' consumption. Ideally adapted for use in this field because of the light transmission and diffusion properties, ureas are now being employed for panels and louvers on fluorescent fixtures, as well as for molded socket crowns.

Another application of ureas, one that is not new but forever interesting, is its use in the packaging field. For boxes and containers that have to be beautiful and right up to the minute in smartness as well as extremely durable, there seems to be nothing quite so popular as the ureas with their seemingly limitless ranges of colors. On this score, the plastic boxes seem to be a perennial winner.

Cellulose acetate plastics never stand still. This year finds them entering into new fields, and continuing their strides into fields long since invaded. Greeting cards, with an almost three-dimensional effect, are now possible through the use of appliques made of this plastic. Sheets of the material deeply drawn to make intaglio or bas-relief designs for window and store interior displays indicate how this plastic, always a natural for decorative use, is continuing to make gains.

Probably one of the most startling advances in the whole industry is the evolution of the molded airplane for defense purposes. As such, of course, there is no plastic plane, but the use of plastic-bonded plywood for this purpose represents an important technological advancement. The fundamental bases for the current progress in plastic-plywood have been the development of forming and molding methods that are superior to anything heretofore known; the development of satisfactory inert bonding agents, the improvement of finishes, the economy of processing, the low cost of construction and the superior aerodynamic qualities. The present urgent demand spurred on by preparations for national defense has caused a focusing of attention on this application of plastics with the result that advances are being made in rapid succession.

Inside and outside, the airplane is gradually assuming a new character and strength all because of plastics. The new trim tab, for example, a recent development and an award-winning entry, will replace aluminum. Used on the ailerons, elevators and rudders of planes, the tabs relieve the pilot of unnecessary forces on the normal flight controls. The tabs are adjustable from the cockpit and by varying their setting, relative to the surfaces to which they attach, the pilot is able to balance the airplane for various conditions of flight, such as cruising, climbing or gliding. By using a laminated plastic, the tabs have combined light weight and strength, while the resiliency of the plastic helps the tab maintain its shape under stress.

This plastic-bonded plywood is not being relegated to the aviation field, however. Exteriors of homes, service stations, boats, large refrigerators for preserving game, bus and truck bodies and outdoor signs—these are but a few of the many applications which this material has experienced during the last year. One of the most interesting uses was in connection with the Narrows Bridge on Puget Sound near Tacoma, Washington. Plywood panels were bolted together to make forms into which concrete was poured. These forms were used repeatedly and at the end of the job, they were still intact and usable.

Another extensive application of plastics in aircraft is the use of clear acrylic and cellulose acetate sheet stock for cockpit enclosures and windows. Practically unbreakable, lighter than glass and weather-proof, these materials are easy to fabricate and almost indispensable to good plane construction.

Indeed, the plastics industry has made important and noteworthy strides during the last year—and the Fifth Annual Modern Plastics Competition is a synthesis of this advancement.

The Competition represents a new high in the in-

dustry's achievement. New materials, novel production methods, fresh designs and original products have all played their part in making it outstanding. It is interesting to observe that the materials which were the accepted standards of yesterday are giving way in some cases to the newer types. These are comparatively few. The newer types more often originate new applications. They find their own new markets, where because of some characteristic they possess, they are adopted. Despite the changes and upheavals, there does not seem to be any apparent decline in the number of entries in any given class. On the other hand, whether new or old, the supply of products in all classes seems to be continually increasing.

The popular custom of holding the Presentation Dinner to distribute plaques and certificates of recognition will again be held this year in the Starlight Roof of the Hotel Waldorf-Astoria, New York, on October 15. The traveling exhibit of Competition winners will also be on the road, making stops in important cities throughout the country thereby furthering the interests of all participants.

Highlighting Competition activities is the new movie: "The Magic of Modern Plastics." Completely new, in sound and color, this 16-mm. film running about 40 minutes will be available without charge to all those companies, associations, clubs and schools who are interested in the great plastics cavalcade. The movie is divided into two parts. The first section is a dramatization of plastics and the part that they play in our national life. Beginning with the discoverer of celluloid, John Wesley Hyatt, the story of the quick and phenomenal growth of the industry is portrayed. The birth and development of other types of plastic materials as well as the various manufacturing processes are covered, all in full color, of course. An interesting feature of this section is the tale of a product, or the course that any plastic product takes from the designer's drafting table to the merchandise counters. Both molding and laminating processes are graphically shown with close-ups that let the audience in on the secrets behind the scenes. Another section in this forepart of the movie is devoted to the intricate and complex work of tool making. The various types of presses employed in molding, machinery and other equipment used in finishing operations are shown in operation. For the first time on any screen, the manufacturing of vinyl resin materials has been photographed in considerable detail.

The second part of the film is concerned with the award winners in the Competition. The story on each prize winner is told: what the item is, how it is used, and what plastics have contributed to its beauty, salability and lowered production costs.

And last, but far from least, we wish to take this opportunity of again expressing our deepest gratitude to the stalwart judges, who trudged for hours among the various displays of entries in an effort to select for you those items which signify the progress that plastics have made during the year 1940. Their job was not easy, but they did it well and graciously.

Our thanks to the judges: Alfred Auerbach, editor of *Retailing* and well known in the home furnishings field as an authority on marketing and distribution. Harvey Wiley Corbett, a member of the firm of Corbett and MacMurray, architects, has served with each Board of Judges since the beginning of our Annual Competition. William A. Kimbel is president of the American Institute of Decorators, president of A. Kimbel & Son, and Accessory Timepieces. He is recognized throughout the country as a prominent interior designer. Morris Sanders has served his fourth year as a member of our jury. As an architect and design engineer, Mr. Sanders has been using plastics extensively in his work. M. W. Petrie is a member of the Research Division Staff of the Jefferson Avenue plant of the Chrysler Corp. Harold Van Doren is an industrial designer with a number of successes in plastics to his credit, and the author of "Industrial Design, A Practical Guide."

Immediately following (pages 45–87) are photographs of Top Award winners. Detailed descriptions of award-winning entries with listing of designers, material suppliers molders, fabricators and equipment manufacturers will be found on pages 90–100. Honorable Mentions are pictured and described on pages 102–111. Photos by August & Company.

ARCHITECTURE

Award to TOURNEUR BEAUTY PRODUCTS, INC.

For detailed descriptions and supplier credits see page 90

ARCHITECTURE

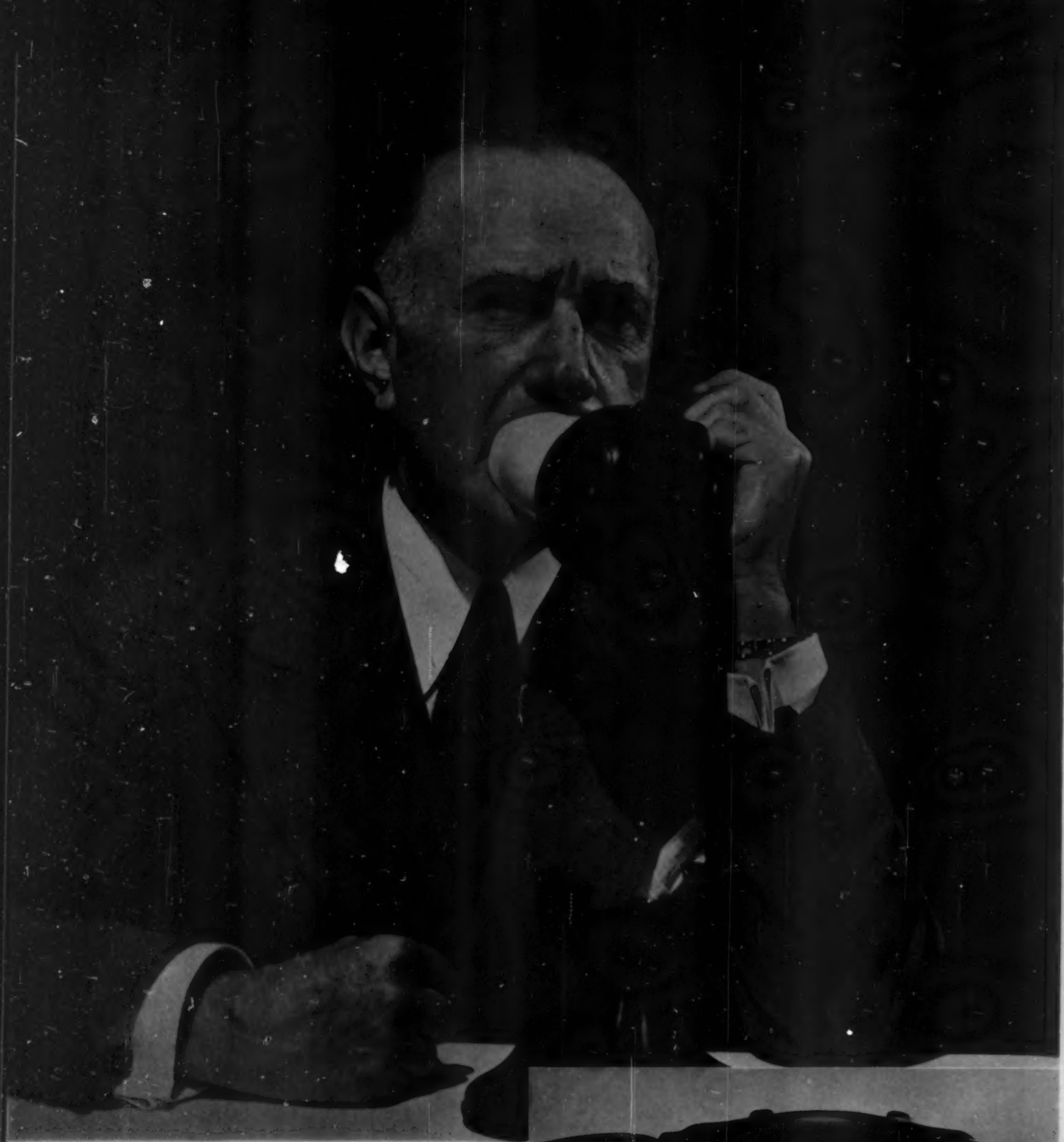
Award to FARRAGUT THEATRE

For detailed descriptions and supplier credits see page 90

ARCHITECTURE

Award to KEYSTONE BRASS & RUBBER CO.

For detailed descriptions and supplier credits see page 91



BUSINESS AND OFFICE EQUIPMENT

Award to TELEPHONE DEVICES CO.

For detailed descriptions and supplier credits see page 91

BUSINESS AND OFFICE EQUIPMENT

Award to UNITED AUTOGRAPHIC REGISTER CO.

For detailed descriptions and supplier credits see page 91

THE FIFTH ANNUAL MODERN PLASTICS COMPETITION

BUSINESS AND OFFICE EQUIPMENT

Award to SPEED-O-PRINT CORP.

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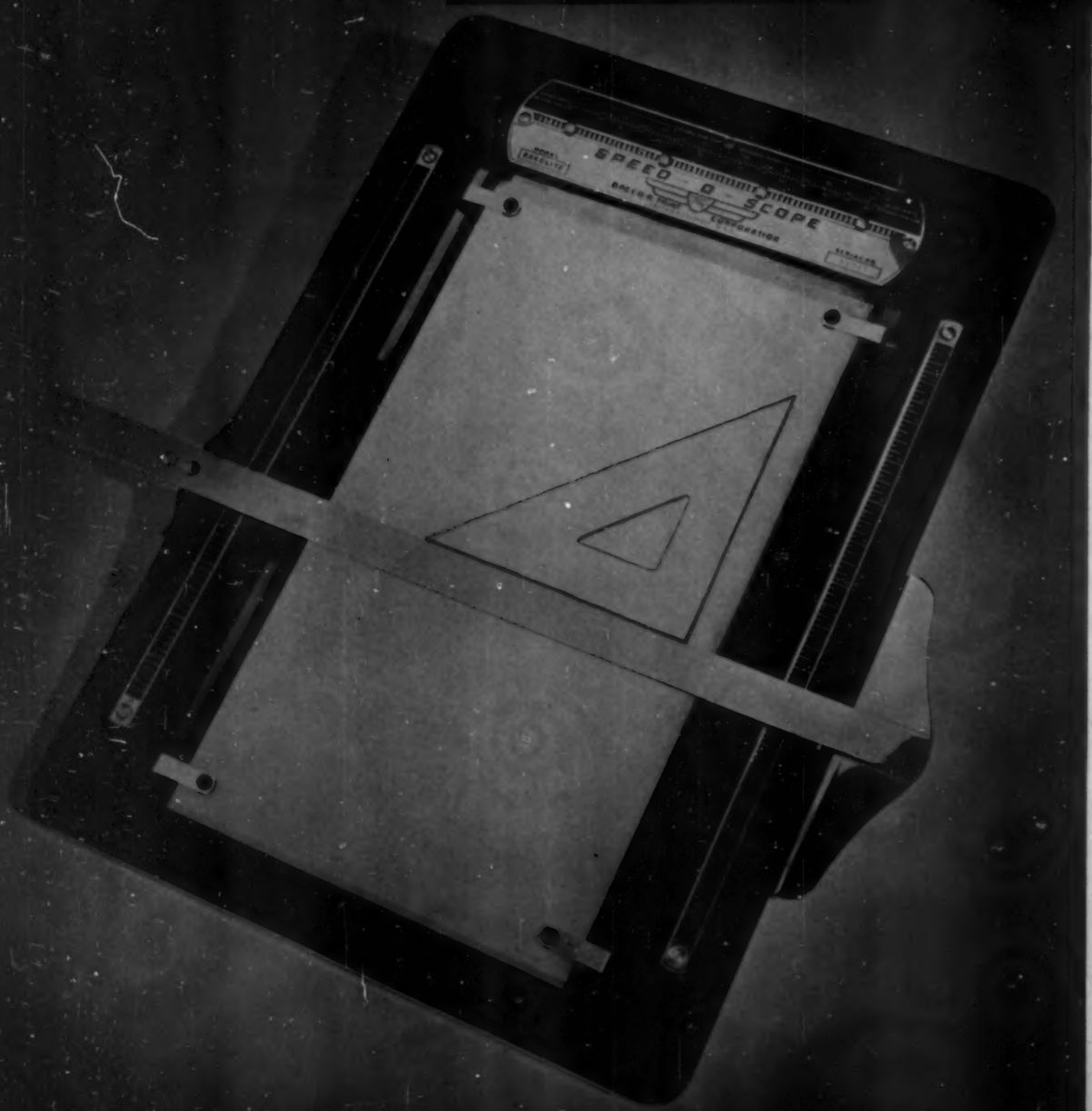
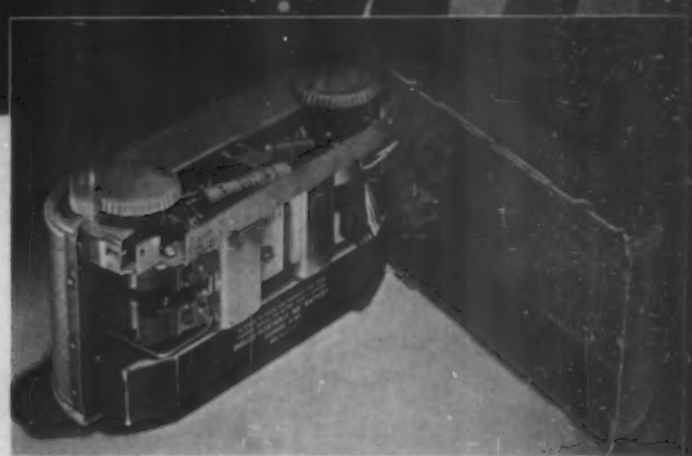
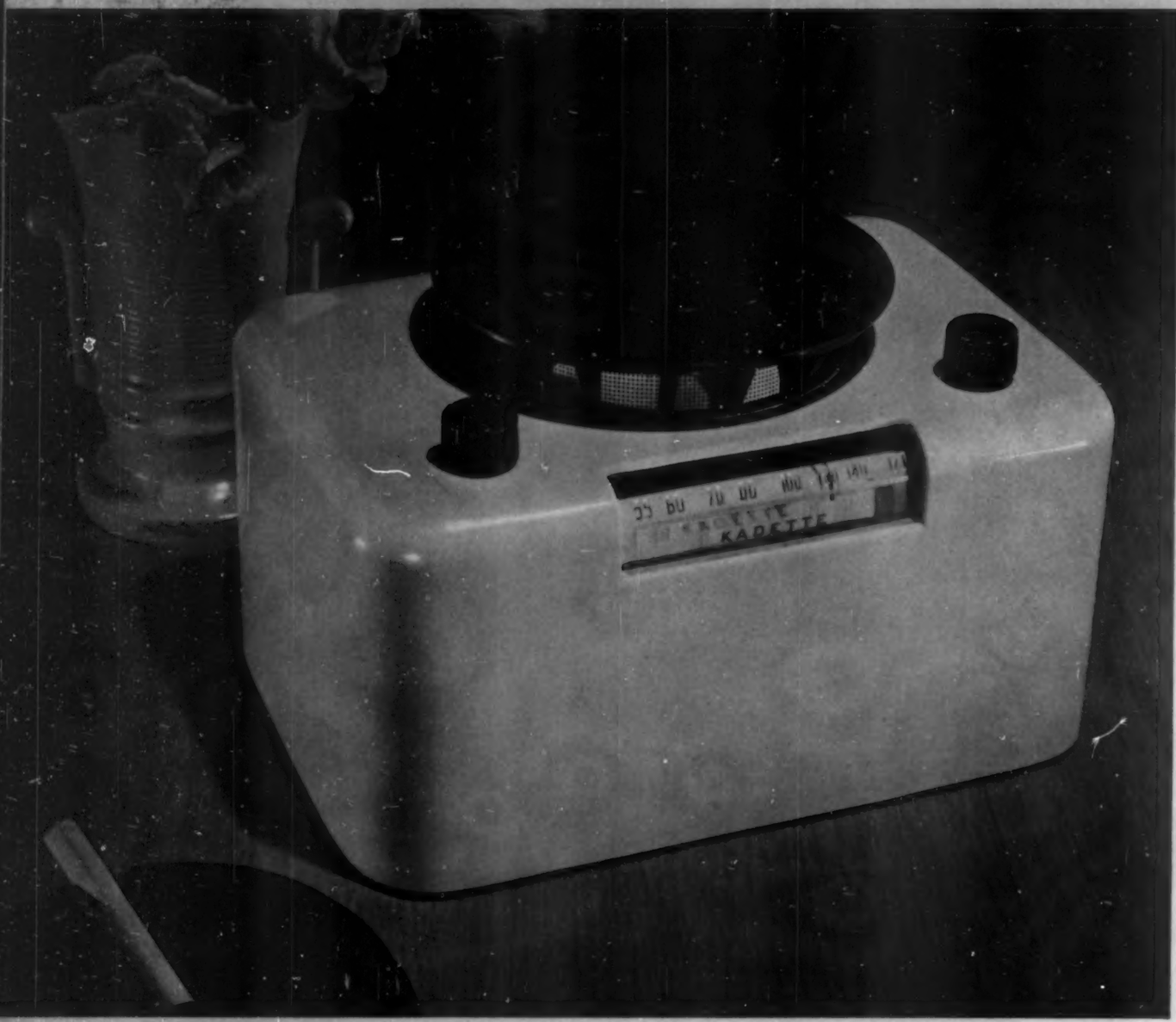




COMMUNICATIONS

Award to PHILCO RADIO & TELEVISION CORP.

For detailed descriptions and supplier credits see page 92



COMMUNICATIONS

Award to KADETTE RADIO CORP.

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COMMUNICATIONS

Award to GENERAL ELECTRIC CO.

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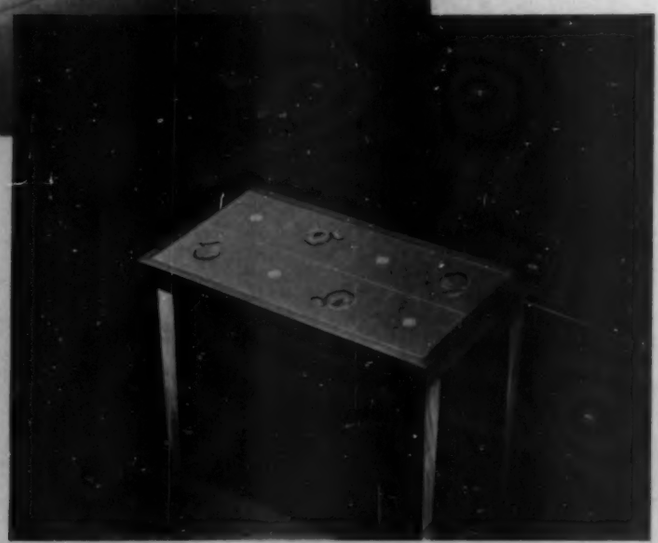

DECORATORS' ACCESSORIES

Award to ALICE DONALDSON

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DECORATORS' ACCESSORIES

Award to ELIZABETH ARDEN

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DECORATORS' ACCESSORIES

Award to J. M. GORDON & CO.

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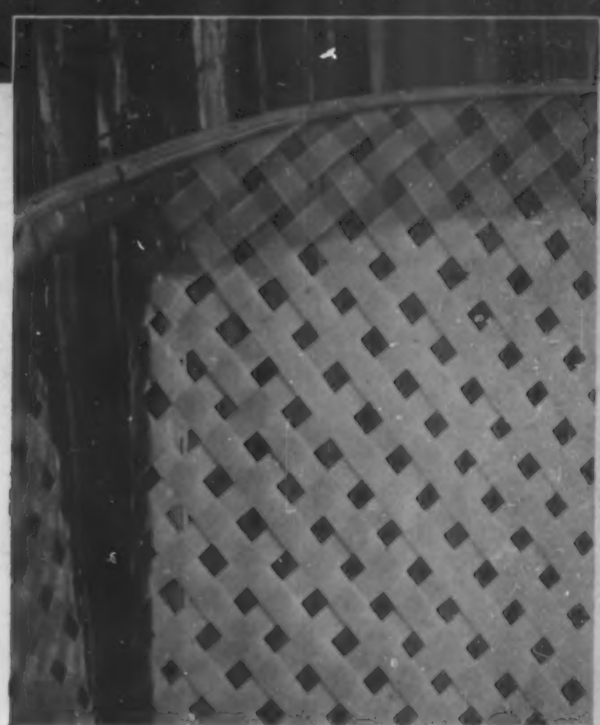

FURNITURE

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FURNITURE

Award to VAZAH INC.

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FURNITURE

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HOUSEHOLD

Award to THE BREARLEY CO.

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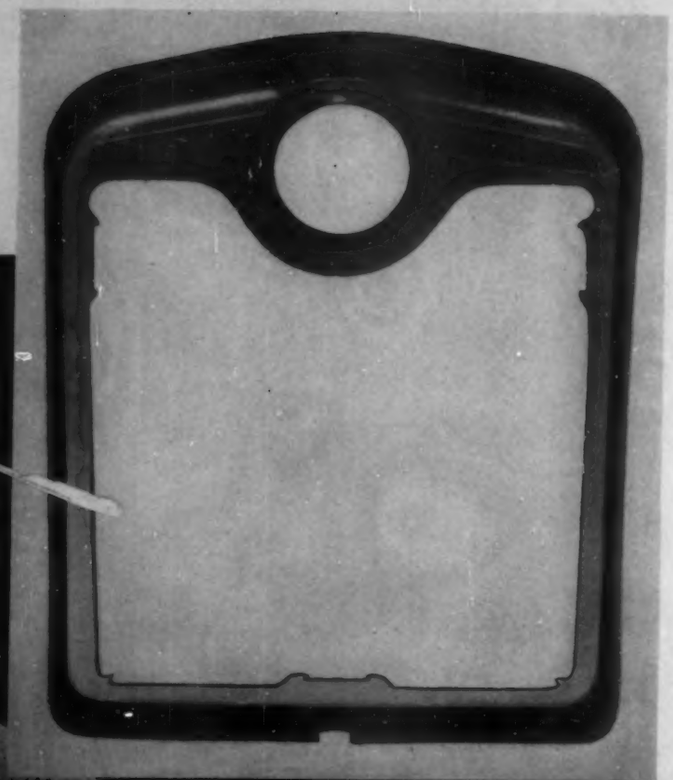

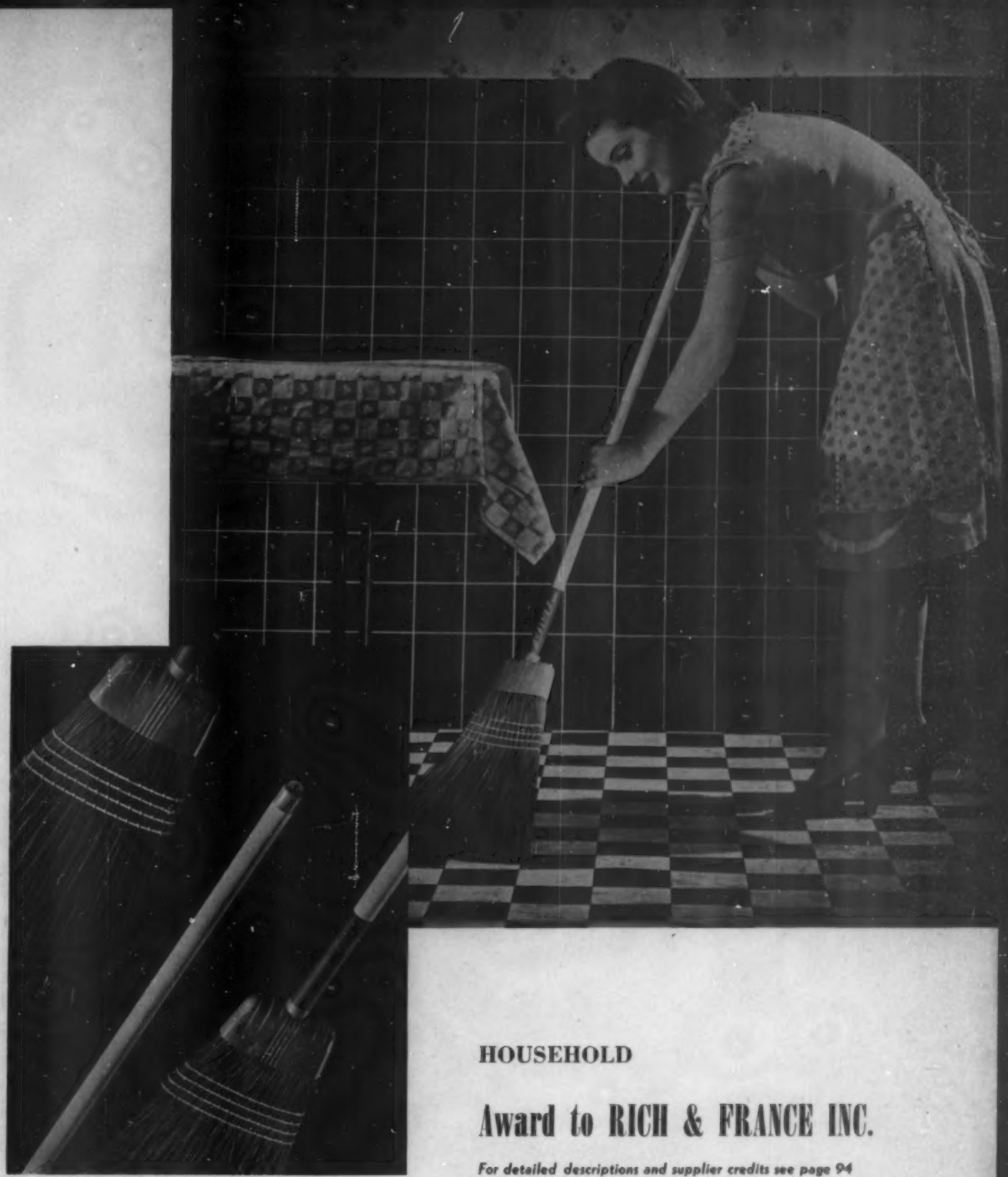

HOUSEHOLD

Award to RICH & FRANCE INC.

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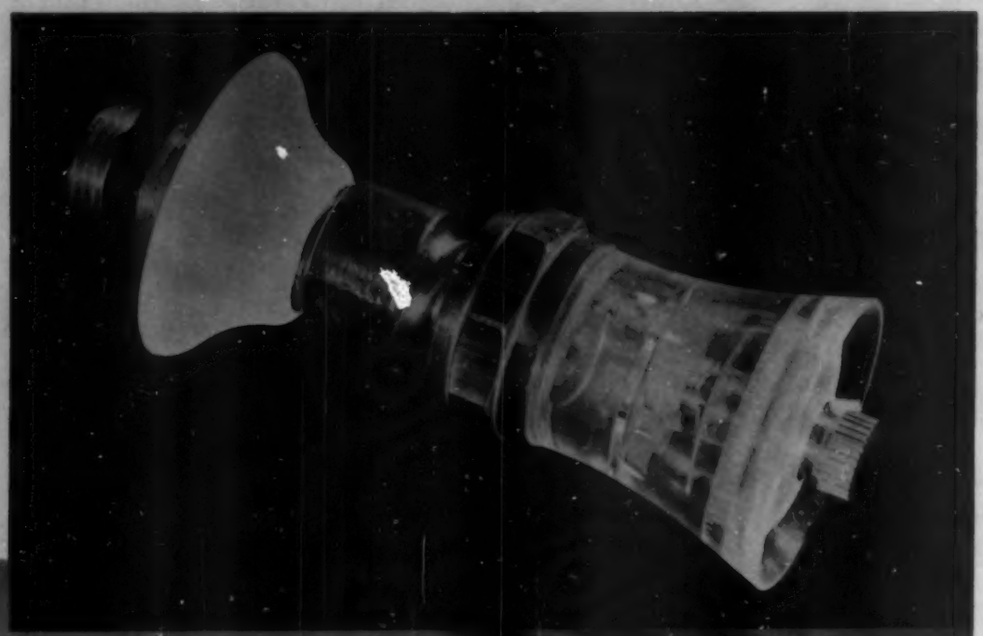
HOUSEHOLD

Award to MUELLER BRASS CO.

For detailed descriptions and supplier credits see page 94



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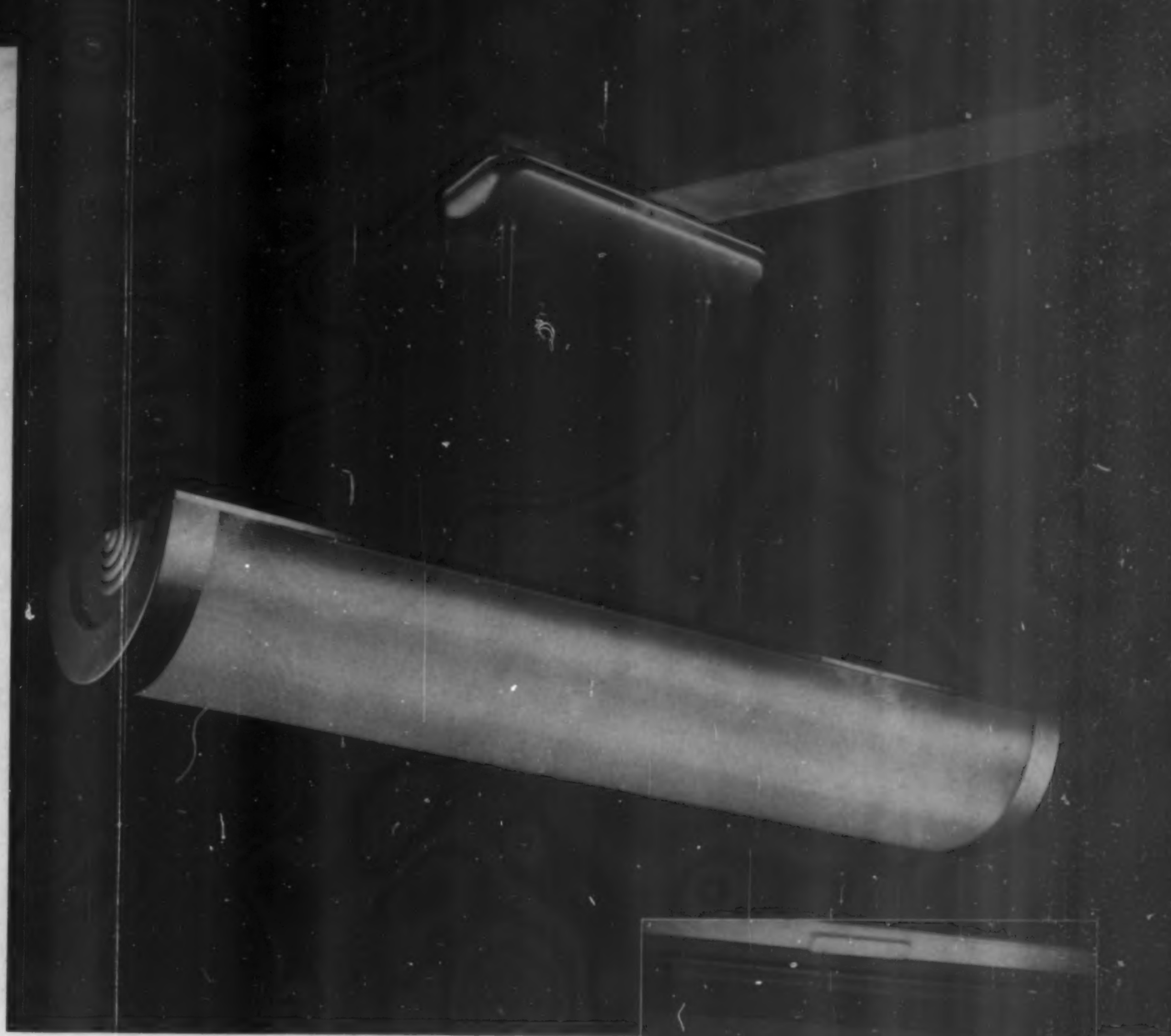

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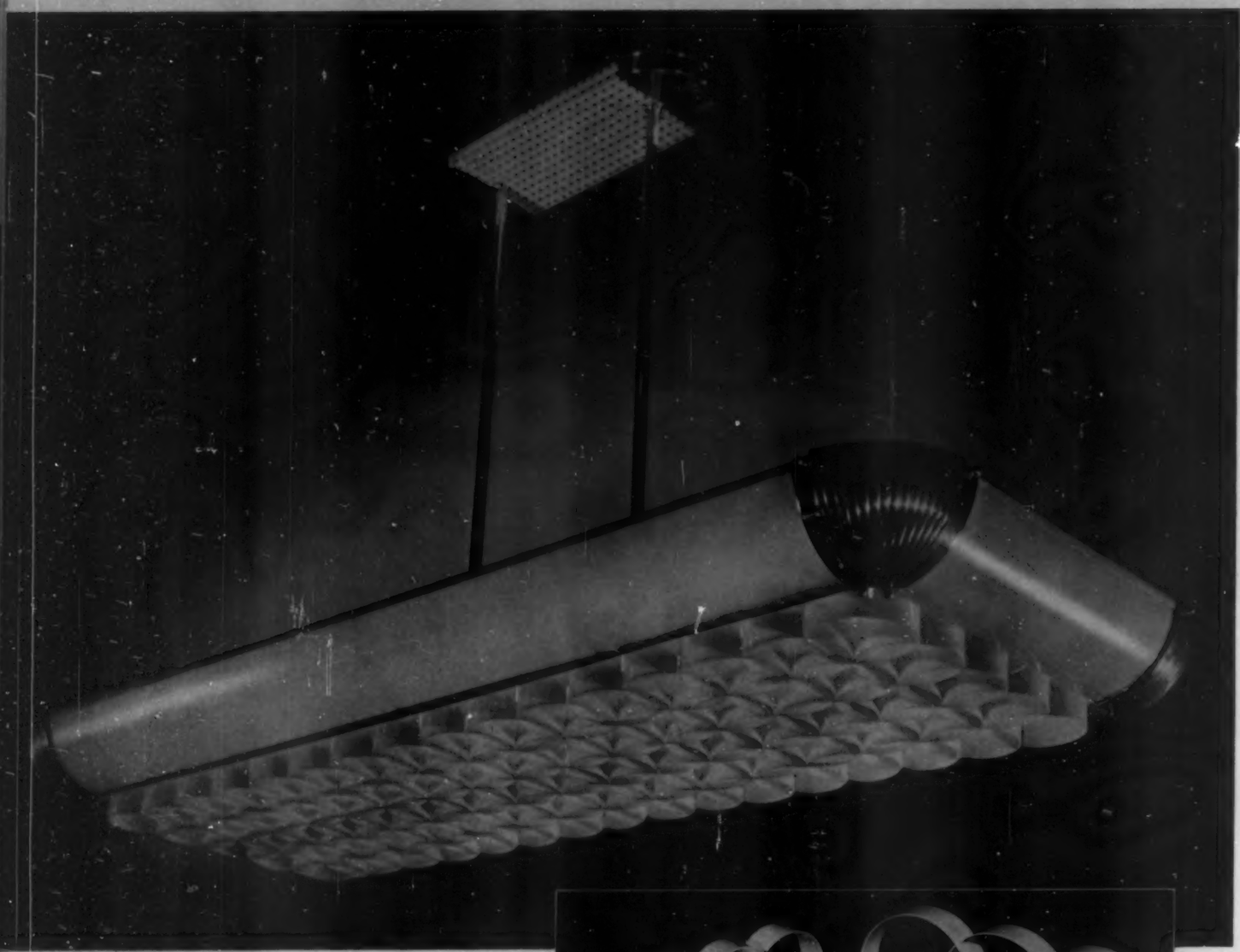

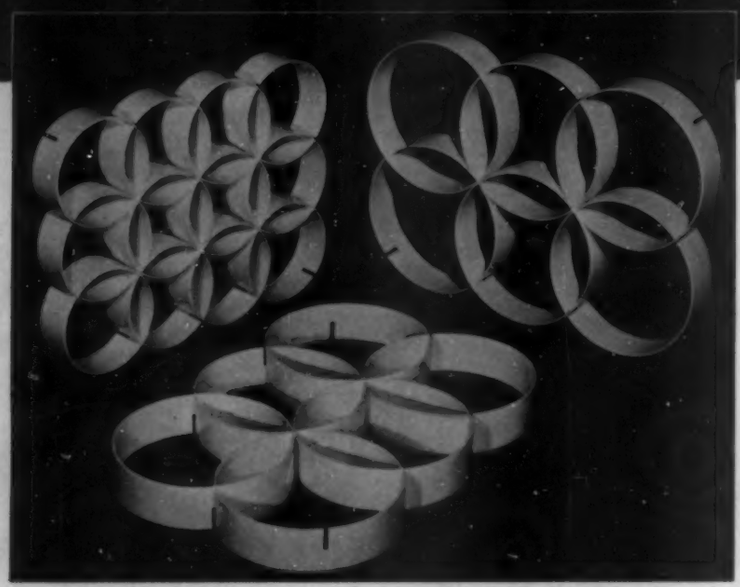

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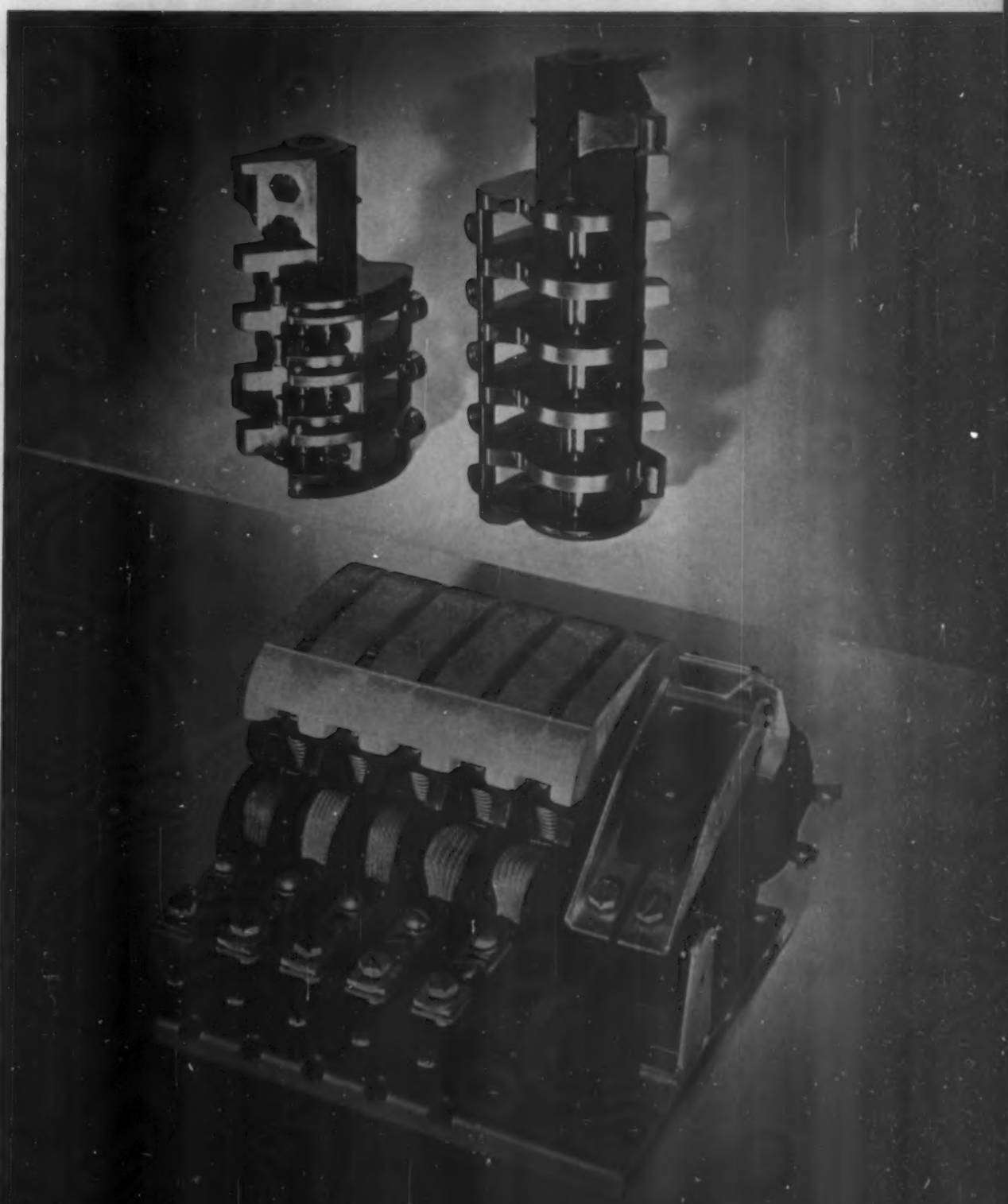

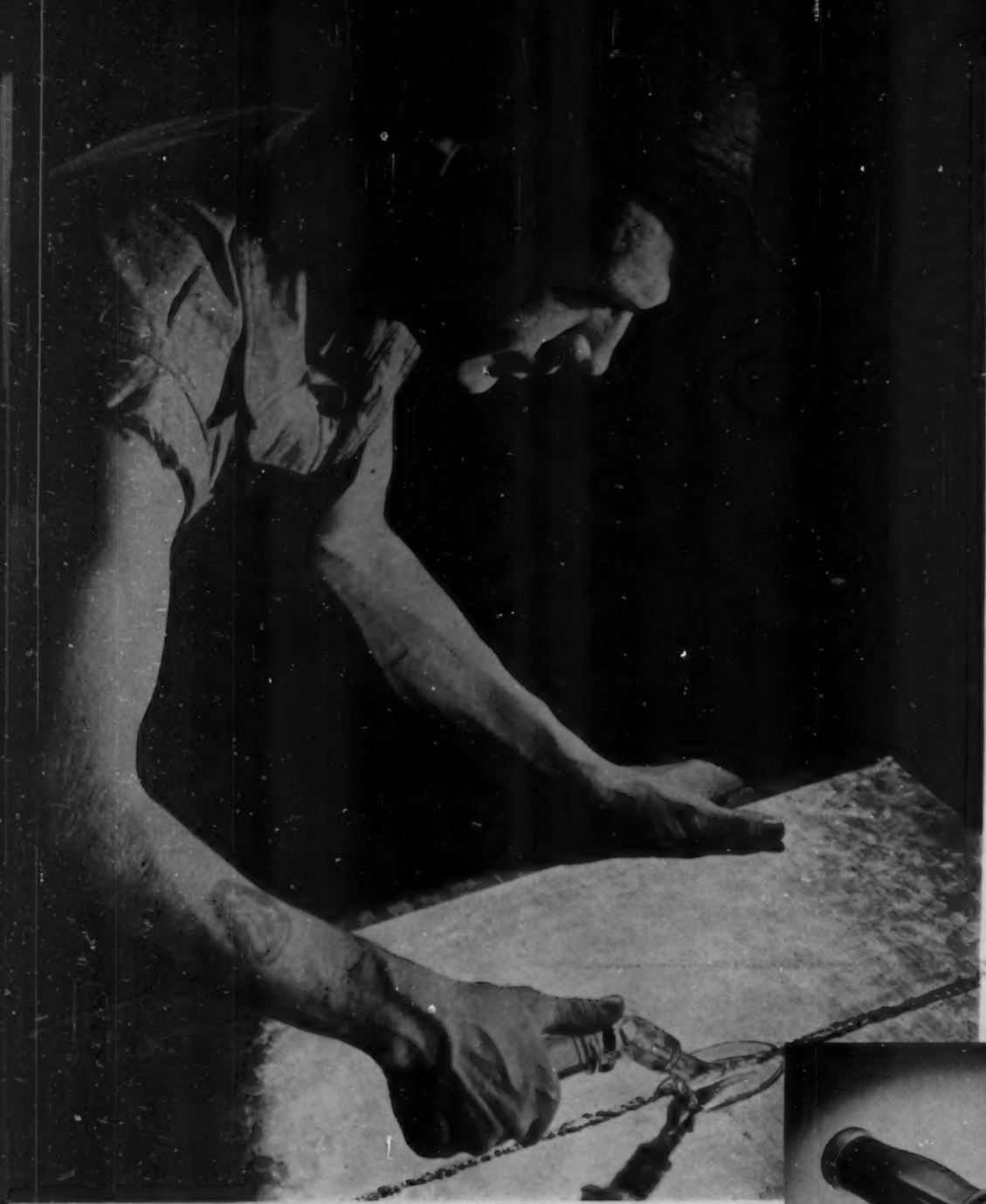

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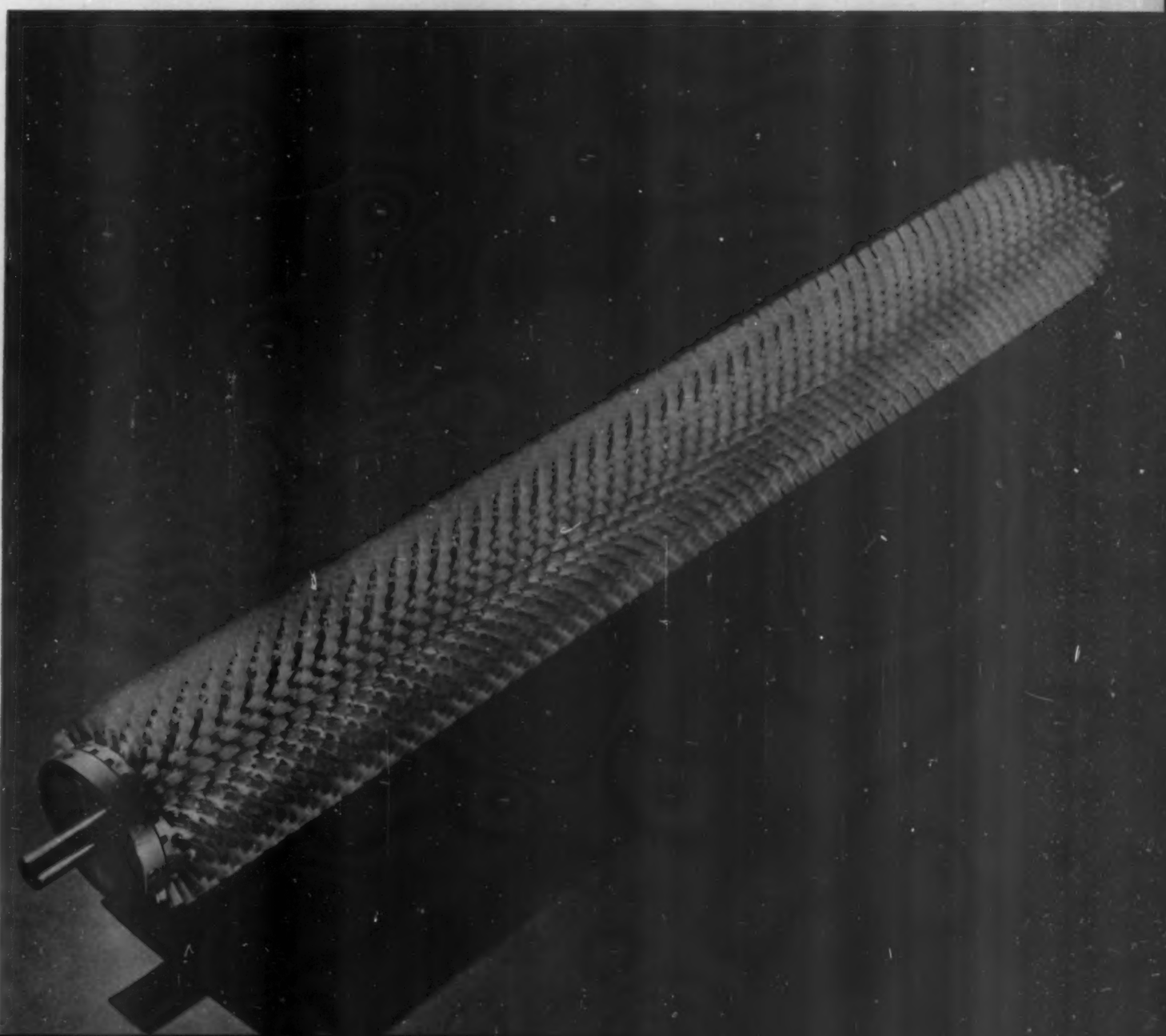

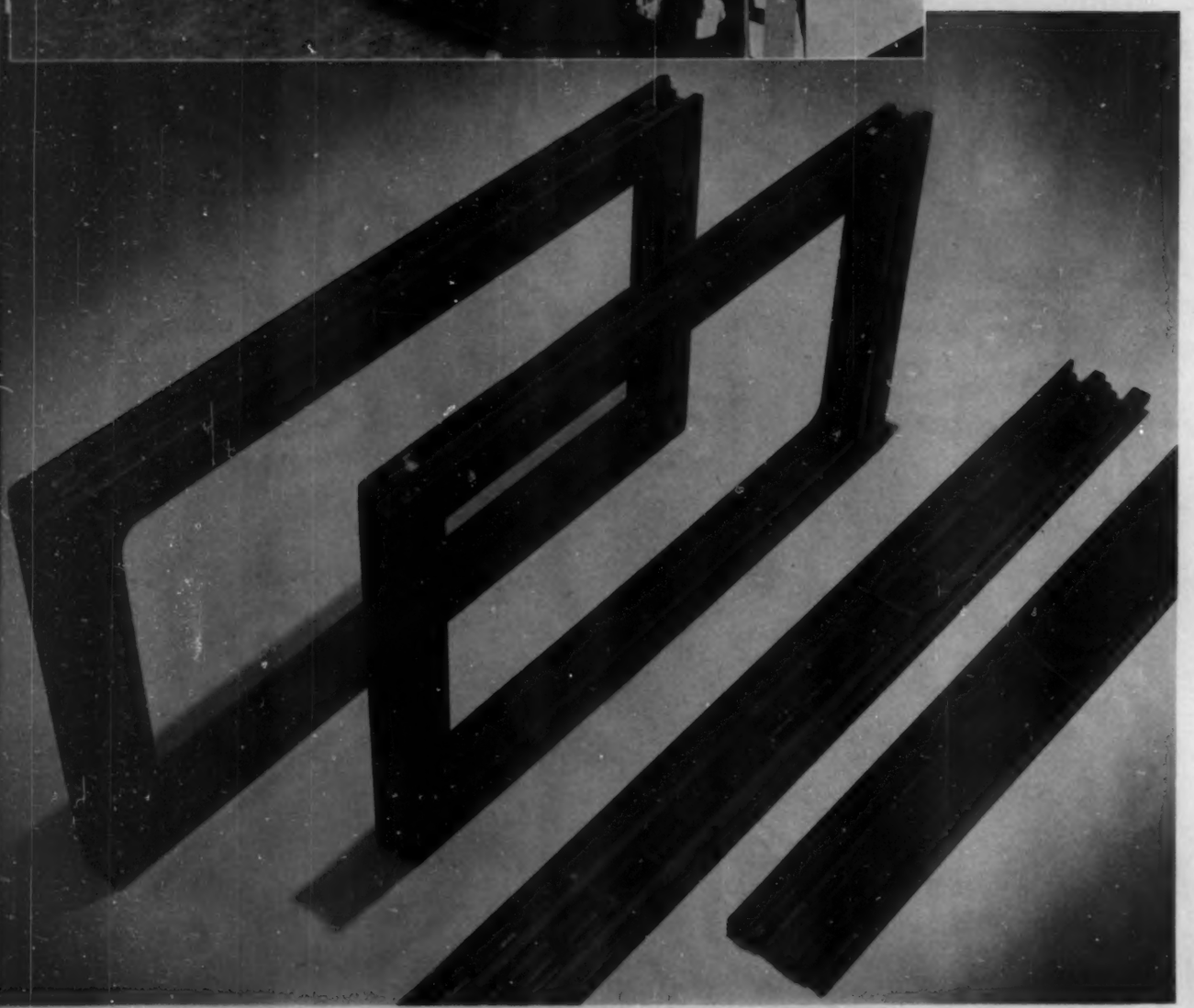

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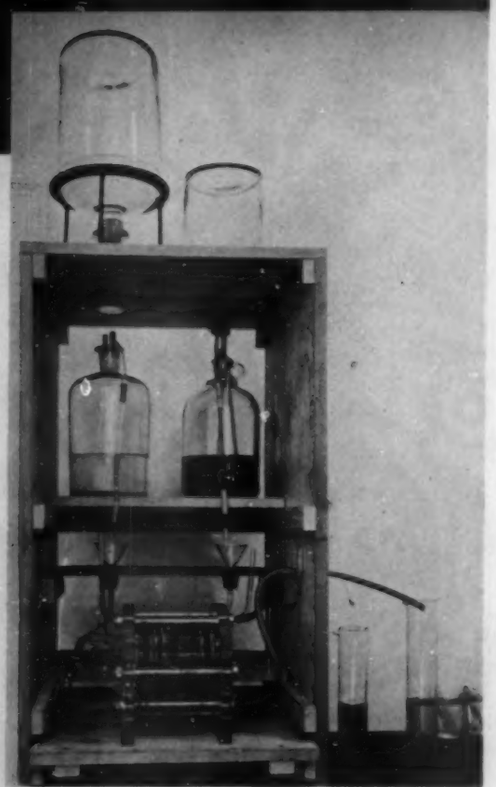

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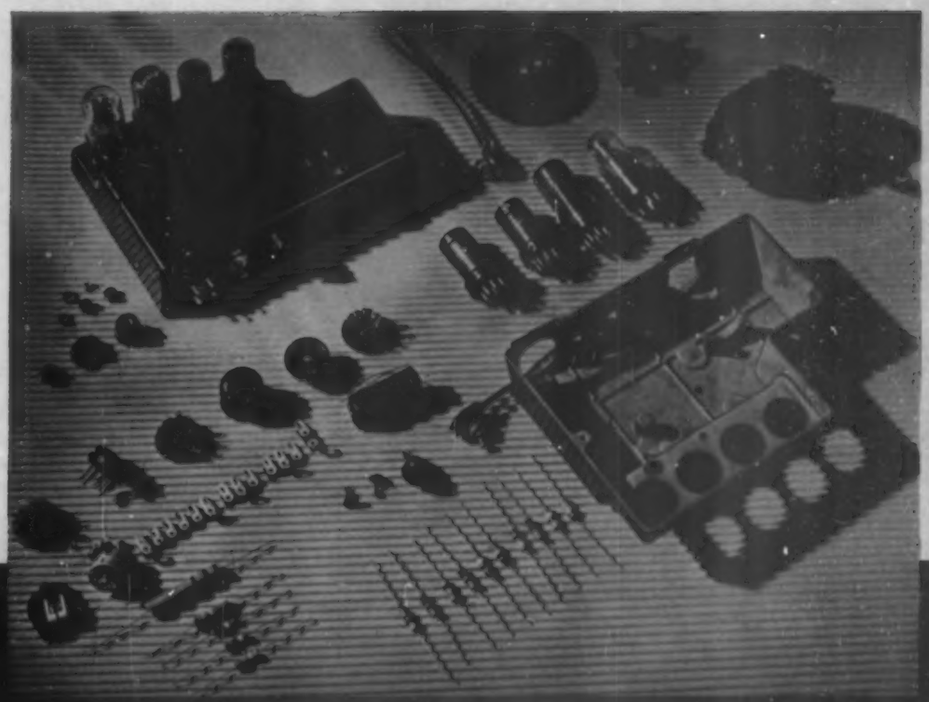

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For detailed descriptions and supplier credits see page 98

SPORTING GOODS, GAMES & TOYS

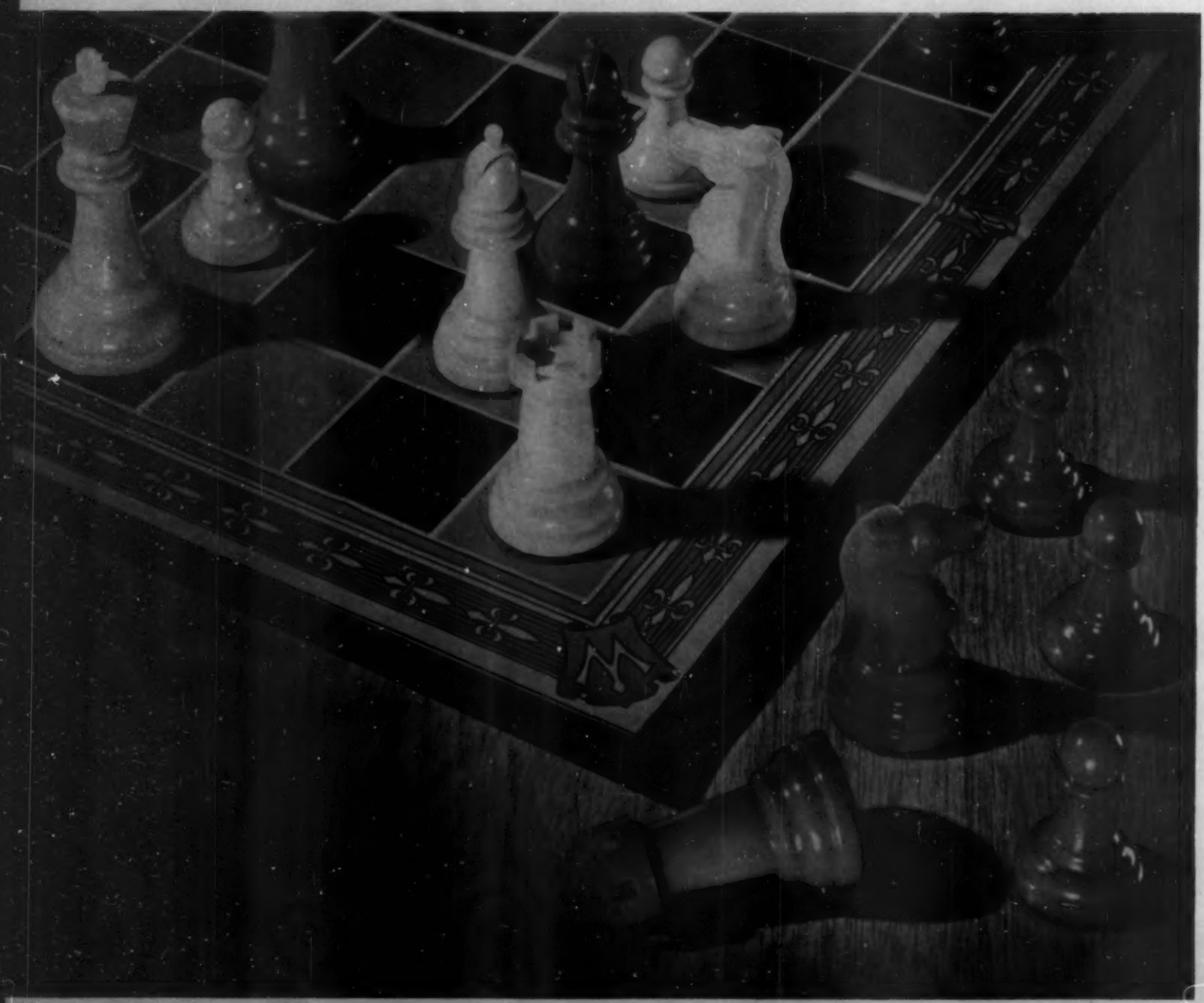
Award to REUHL PRODUCTS, INC.

For detailed descriptions and supplier credits see page 98

SPORTING GOODS, GAMES & TOYS

Award to GALLANT KNIGHT, INC.

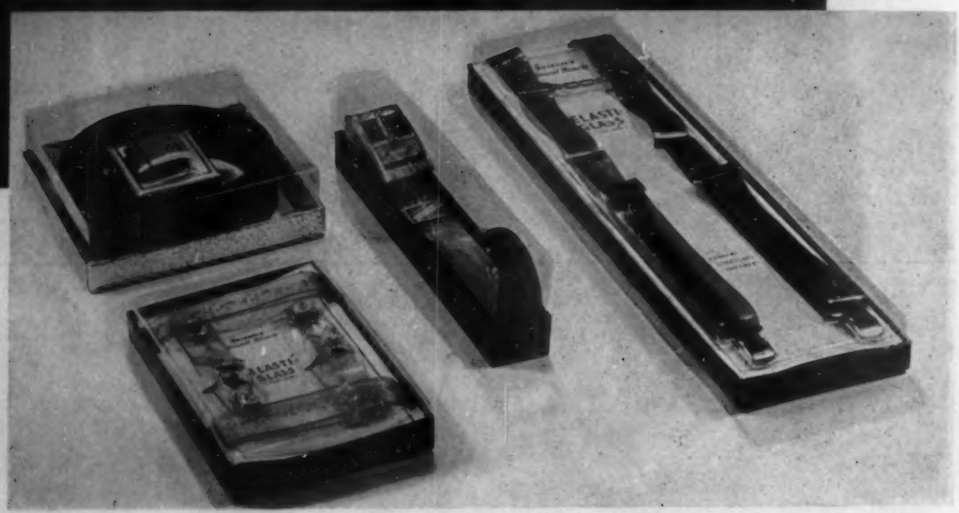
For detailed descriptions and supplier credits see page 98



SPORTING GOODS, GAMES & TOYS

Award to HARMONIC REED CORP.

For detailed descriptions and supplier credits see page 99



STYLE AND FASHION

Award to S. BUCHSBAUM & CO.

For detailed descriptions and supplier credits see page 99

STYLE AND FASHION

Award to SAKS FIFTH AVENUE

For detailed descriptions and supplier credits see page 99

STYLE AND FASHION

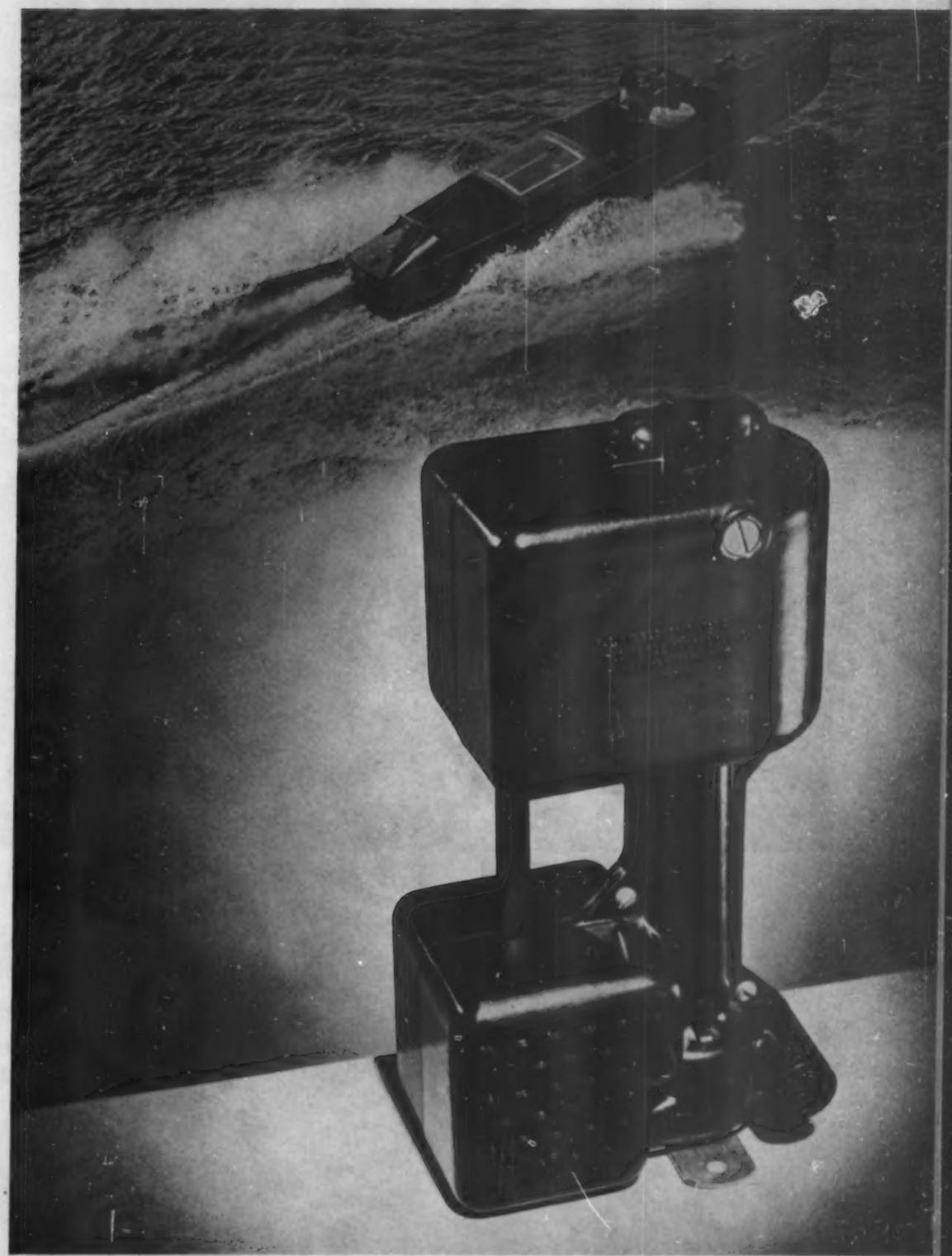
Award to McCOY, JONES & CO., INC.

For detailed descriptions and supplier credits see page 99

TRANSPORT

Award to GEO. W. FLEMING CO.

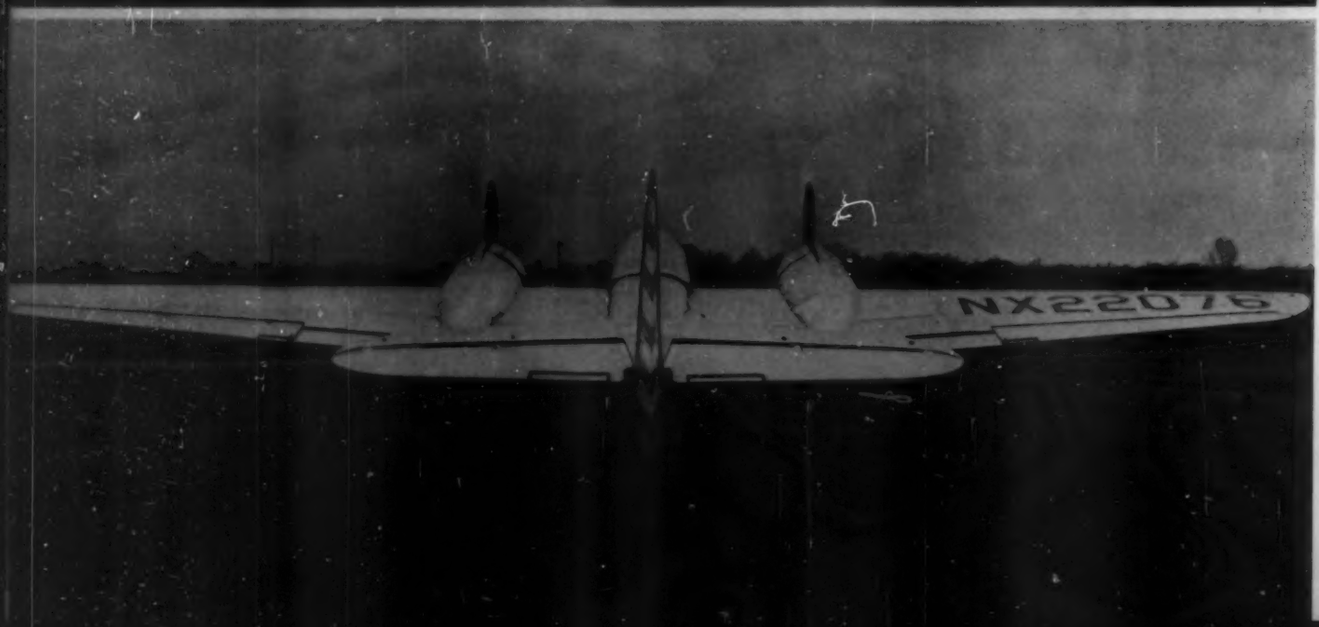
For detailed descriptions and supplier credits see page 99

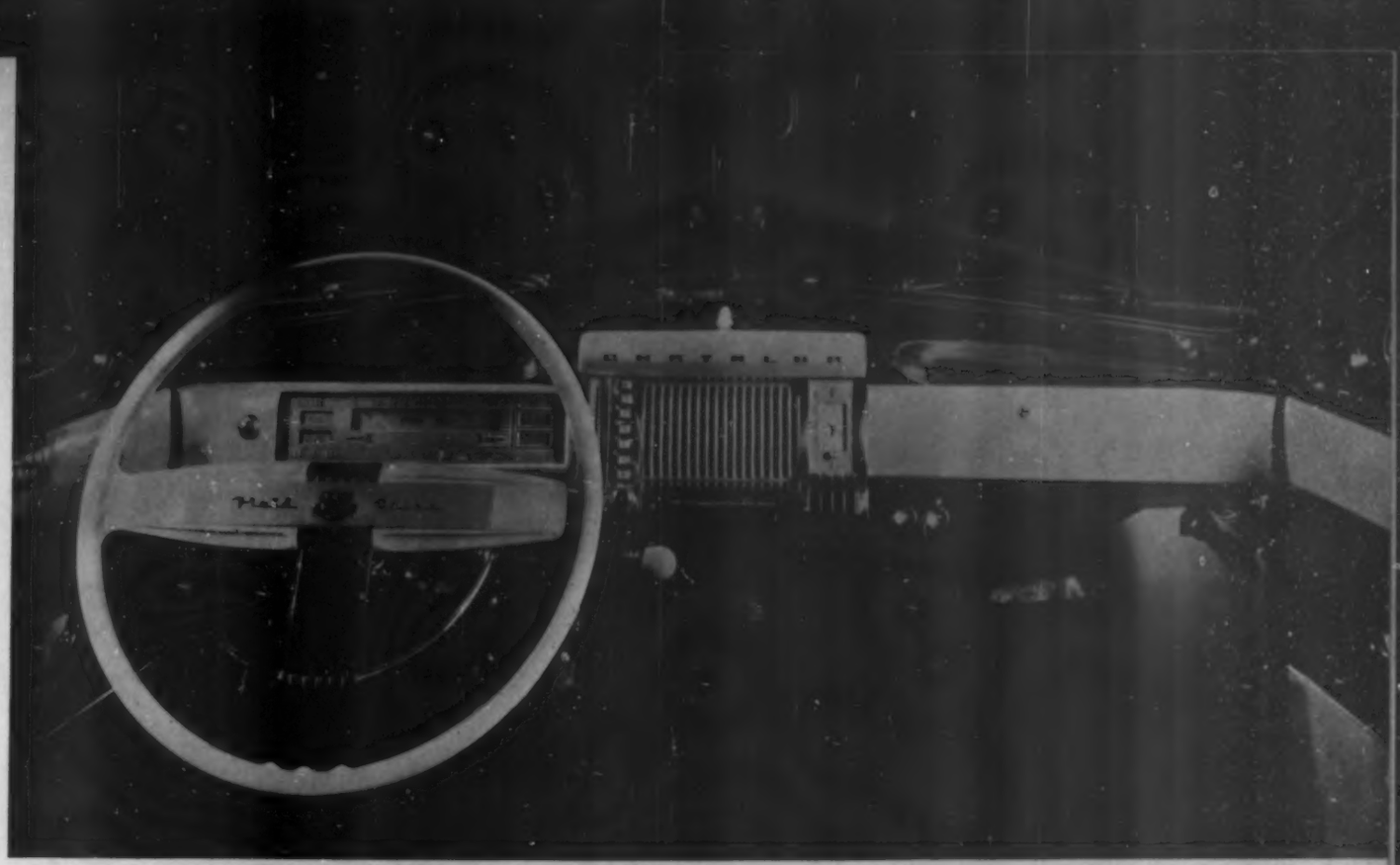


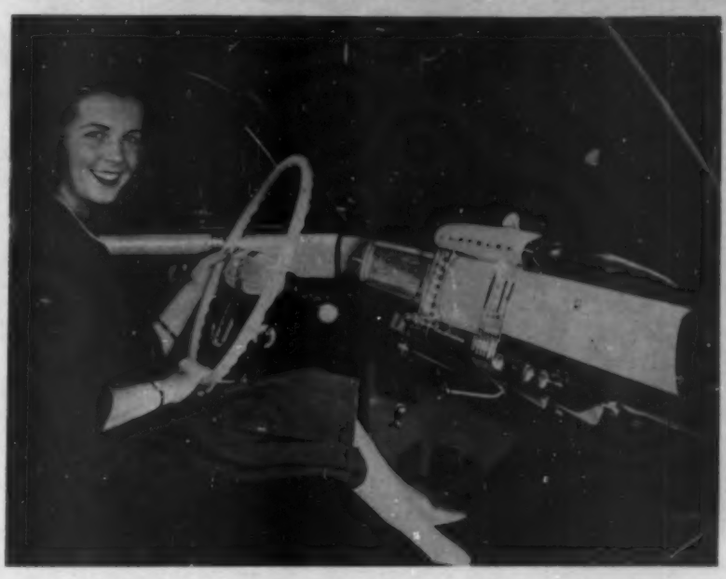
TRANSPORT

Award to GLENN L. MARTIN CO.

For detailed descriptions and supplier credits see page 100







TRANSPORT

Award to CHRYSLER CORP.

For detailed descriptions and supplier credits see page 100

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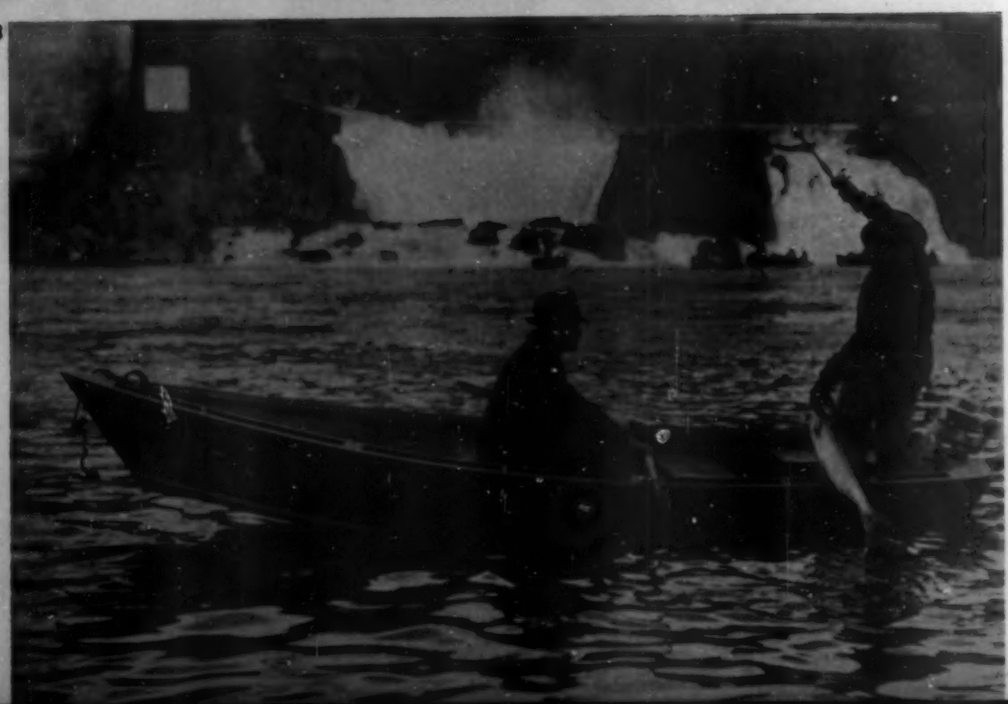

SPECIAL AWARD

Award to M & M WOOD WORKING CO.

For detailed descriptions and supplier credits see page 100

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AN INVITATION TO THE PLASTICS SHOW

Come one, come all! We feel sure that you will enjoy the exhibit of Competition entries, because the display is chock full of all sorts of interesting—and startling—applications of plastics. **1**—Looking across the group of household items toward the decorators' accessories, we see two winners in the foreground, the shower head and scale. **2**—On down the line we find an interesting collection of style and fashion items; to the right a partial view of the industrial products; and if you'll look 'way in the back you can see some of the scientific entries and the two fluorescent lighting fixture winners. **3**—There are novelty and miscellaneous pieces galore, and they are far from non-descript! **4**—The furniture is tops in looks and in comfort—too tempting, indeed, for visitors after their trek around the spacious exhibition. **5**—Toys, communication devices, with a new type of advertising display, a woven plastic screen and more furniture in the background. **6**—A few of the entries in the lighting division with the award winning sign letters in the center. We cordially invite you and your friends to see this display; it is the largest collection of plastic applications ever gathered together in one place. There is no charge, of course, and attendants are on hand to give you information about any and all of the products. You'll find it in Suite 306, Chanin Building, 122 East 42nd St., New York City. The hours are from 10:00 a. m. until 4:00 p. m. each day except Saturday, when we close at noon. And you have until December 14th of this year!

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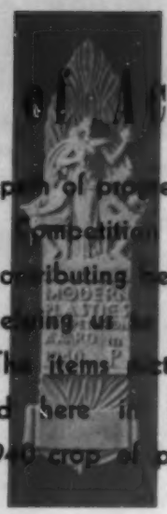
An Index of Achievement



Milestones along the path of progress and accomplishment, the winners in the competition are representative of the way plastics are contributing beauty, comfort and convenience; they are helping us to maintain the American standard of living. The items pictured in the preceding pages and described here in detail are the highlights of the 1939–1940 crop of plastics accomplishments

ARCHITECTURE

Tourneur Beauty Products, Inc.

Subdued elegance, flattering comfort with a minimum of maintenance, form the sales background in the new Tourneur Make-up Salon. From floor to ceiling dramatic applications of plastics combined with modern illumination, air-conditioning and lighting distinguish the shop for which the architect has created a number of brand new uses for vinyl resin. A huge pink satin and white lace curved couch is protected by a complete overlay of highly plasticized vinyl sheet. At the make-up bar this same transparent material, covering fiberglas fabric, forms a cushiony surface that's easy on the elbows. What's more it's resistant to grease and stain—wiping with a damp cloth is the only cleaning chore needed. Strips of the plastic, 2 in. wide, are interwoven into flexible webbed seats and backs for simple, comfortable chairs. Very thin sheets of the same material are draped in a swag effect directly above filing cabinets, serving to soften light. Unplasticized vinyl sheets creep into top drawers of cabinets as stain-proof linings and extruded vinyl strands become the coiffure of a window display manikin and are used as bodice lacings on attendants' gowns. Even the floor is of a vinyl-derived material in a harmonizing marbleized pattern. Other plastic materials through the shop help create enduring architectural beauty. Washable laminates surface vulnerable spots—chalk-white for the circular coffee table, marbleized beige-brown for service bar, ledges and shelves. Curved sheets of white translucent acrylic flatter mirror lights. Clear circular disks of this plastic support a glass table top and decorative wall plaques are sandwiched between thin acrylic sheets. Overhead, the light fixture is shielded with a new louvered cellulose acetate sheet material. Wall lighting tubes are concealed by this plastic also. For complete description see MODERN PLASTICS, June 1940, page 40.

(*See page 45*)

Architect-Designer: Morris Sanders. Material: Vinylite, Carbide & Carbon Chemicals Corp.; Formica, Formica Insulation Co.; Plexiglas, Röhm & Haas; Louverglas, Doane Products Co., E. I. du Pont de Nemours, Inc. Fabricators: Chairs: Walter P. Sauer; Sofa: Clarence Veit

★ ★ ★

Farragut Theatre

A new entrant into the display and decorative field is an inlaid fluorescent laminated sheet material, which provides glowing, luminous designs in dark or semi-dark places. Particularly applicable for theatres, night clubs, airplane control cabins and public corridors, the material may be used for signs, markers, dials, switch plates, panel markings, over drinking fountains, over bars as murals, wherever white light is turned off and ultraviolet or "black" light is used. The fluorescent effect is produced by chemicals which have the property of converting invisible ultraviolet light into visible light. These chemicals are incorporated into the resin ordinarily used for colored laminates and the pressed sheet is formed by the usual method so that the fluorescent color is an integral part of the sheet. The effect is different from phosphorescence in that it stops immediately when ultraviolet irradiation is stopped. On the fountain panel pictured on page 46 two fish in colors and other designs appear in ordinary light. In black light one fish disappears and the rest of the design glows brilliantly. The white and ultraviolet irradiating lamps are contained in the base. Both daylight inlays and ultraviolet inlays can be contrasted for trick effects, such as: areas in which the same color is used in both white and ultraviolet light; areas which disappear in white light and show up in the ultraviolet and vice-versa; areas which bring out different colors in white than in ultraviolet light.

(*See page 46*)

Material designer: John Dryer. Material: Formica Fluorescent Inlaid, by Formica Insulation Co. Architect: John & Drew Eberson. Construction & Installation: Homack Construction Company

Keystone Brass & Rubber Co.

Really durable in spite of their dainty, fragile appearance Jewelite door knobs of clear plastic are now available for the moderate-priced home. In the past the closest approach has been expensive clear crystal glass knobs imported from Czechoslovakia and Belgium, but this supply was cut off by the current war. Moreover, the imported knobs were highly breakable, heavy and obtainable in one color only. The use of clear acrylic and polystyrene permits mass production of a full range of gemlike colors—amber, sapphire, ruby, emerald, amethyst, etc.—to blend with modern interiors. The simple attractive design—swirling concentric circles which mask the metal attachments inside—is economically achieved by molding a two-piece hollow shell. Lightweight and practically unbreakable—knobs may be shipped in quantity at comparatively little cost. And there is no danger of their splintering in the hand should the lock stick. Pleasant to the touch, the plastic exterior will not catch dirt and is immune to polishing abrasives, alcohol, ammonia, disinfectants and even nail polish. The high luster makes it easier to find in the dark, especially in contrast to dull wood finishes.

(*See page 47*)

Designer: H. A. Husted. Materials: Bakelite polystyrene, Bakelite Corp.; and Crystalite, Röhm and Haas Co., Inc. Molder: Standard Products Co., Thermo-Plastics Division

BUSINESS AND OFFICE EQUIPMENT

Telephone Devices Co.

Confidential telephone conversations in the presence of visitors, can be carried on in complete secrecy with the Silentfone. Complete plastic, except for the acoustical sound absorption material within the exhaust chamber, the device is made of three molded parts—a base of heat-reactive phenolic, a hemispherical top which snaps onto the base, a reverberation chamber, and a translucent ivory swivel mouthpiece of cellulose acetate. Although larger than the standard transmitter, which it encompasses, the device offers no hindrance to routine operations. In idle position, the device clears the desk by $^{3}/_{16}$ in. as the mouthpiece fulcrums within the hemispherical section permitting the Silentfone to telescope when the phone is placed on the cradle. When the phone is lifted the mouthpiece is snapped out to fit snugly over the speaker's lips. Extensive tests were conducted with and without the device so that acoustical properties would be developed to completely absorb the speaker's voice. Special adjustments along with the felt absorbing material block out the conversation to an outside audience and actually amplify actual sound, facilitating undistorted transmission to the listener at the other end of the wire. Because of its irregular contours the injection molded mouthpiece was the most difficult of the three intricate pieces. The mold had to be constructed in two pieces so that the two halves could be separated by a straight line movement. All three parts were made to fit accurately with a minimum of fasteners—only two small pins, yet it can be easily taken apart for cleaning.

(*See page 48*)

Credits—Designer: L. D. Scher. Materials: Bakelite phenolic, by Bakelite Corp.; Plastacele by E. I. du Pont de Nemours & Co., Inc.; Molder: Tech-Art Plastics Co. Equipment: Injection press by Watson Stillman Company

★ ★ ★

United Autographic Register Co.

Injection molded on a 2-minute cycle, the UARCO portable register housing is one of the largest thermoplastic units with metal inserts ever produced by this method. (See MODERN PLASTICS, June 1940, page 38.) The shell, about 14 in. long, $7^{3}/_{4}$ in. wide and 4 in. deep, weighs 1 lb. $14^{1}/_{2}$ ounces, including metal. Made of cellulose acetate butyrate, the case is manufactured at a cost ten percent less than for one of metal. No finishing is required except removal of the sprue. Shock resisting, it is adequately braced for stability at all needed points by reinforcing ribs, struts and a perfectly welded metal band. The warm, smooth surface will not chip, dent or rust and has a degree of permanence that defies time, abuse and strong washing solutions. Lightweight—30 percent less than metal—the case helps to reduce the salesclerk's burden and provides economy in shipping costs as well. Colors can be produced to blend with store interiors.

(*See page 49*)

Designer: Robert D. Budlong. Material: Tenite II, by Tennessee Eastman Corp. Molder: Sinko Tool & Mfg. Co. Equipment: Hydraulic Press Mfg. Company

★ ★ ★

Speed-O-Print Corp.

Precision made for exact draftsmanship, the Speed-O-Scope includes in its construction all the necessary devices to simplify accurate tracing of lines, drawings, illustrations, cartoons, diagrams and forms. The huge ebony chassis, measuring $14^{1}/_{4}$ in. by $20^{3}/_{4}$ in. by $6^{3}/_{4}$ in. high is completely molded in one piece so that there will be no warping, bending or misalignment. Dimensionally stable, the phenolic material is well insulated against heat and shock from the illuminated drawing area. The sleek surface will not scratch or mar easily, is permanent in finish, and permits unimpeded manipulation of instruments in work. Arm rests are sturdily constructed, top and side typewriter scales are clearly visible and adjustable clamps hold stencils in place. The device is equipped with chromium plated T-square, plastic triangle, writing plate stylus, removable light fixture and a well for holding accessories. The case is trimmed in contrasting ivory and has a removable cherry red back, with molded-in ventilating louvers, which houses the light bulb.

(*See page 50*)

Material: Bakelite phenolic, by Bakelite Corp. Molder: Chicago Molded Products Corp.

COMMUNICATIONS

Philco Radio & Television Corp.

Small portable battery operated radios—ready for rough service indoors or out, on bicycle or horseback, on terra firma or briny deep, have captured the public's imagination. This year, the nationwide anxiety to keep abreast of the cataclysmic international news has played no small part in stimulating everyone's desire for news wherever he goes. Philco has met the demand for these sets with an all-plastic case that can be carried over the shoulder like a camera. Injection molded of cellulose acetate butyrate the two-piece housing economically achieves minimum weight, maximum durability and compelling eye appeal. Color variations are practically unlimited and the rich finish creates a smart accessory with none of the mechanical aspects of metal. Weight of the housing—about 1 lb.—is comparatively little. Though strong, walls are thin causing little increase in size over the works inside. Harmonizing leatherette strips at each end, on either side of the grille, decorate the finished case. The cabinet assembly is neatly joined so that it is possible to take the two halves apart for the replacement of batteries and tubes without the use of tools. Matching the case, both the station selector and volume control knobs set deep in the case—have filled-in depressed letter control directions including the scale. Fifty feet of aerial for the set is incorporated in the shoulder strap forming the antenna. Adjustment loops on the strap are of the same material as the knobs and case. Injection molded cabinets are an innovation in the radio field. Thermoplastics, generally regarded as being too heat-sensitive for the purpose, are well adapted for battery operated sets, since these do not develop such extensive or intensive heat as that created in an AC or DC operated radio. Moreover, the resistance to impact and shock, non-brittle characteristics of the material as well as stability in all climates are a decided advantage in both shipping and actual use of the radio.

(*See page 51*)

Material: Tenite II, by Tennessee Eastman Corp. Molders: Case, Standard Products Co., Thermo-Plastics Div.; Knobs, Bridgeport Molded Products, Inc.; Loops, American Insulator Corp. Equipment: Injection Molding Machine, Reed-Prentice Corp.; Tools: Royal Tool Co.; Steel, Carpenter Steel Company

★ ★ ★

Kadette Radio Corp.

A unique combination of mechanics with compact radio design, the Kadette Topper features a new principle of uniform sound projection in conjunction with unusual chassis construction. Completely finished on all sides the cabinet presents an attractive appearance from any angle and protects "innards" from dust or tampering. Fine tone diffusion is created by the rigid cone-top speaker which disperses the sound throughout a full 360 deg. swing. The top baffle plate or sounding board reflects without distortion. This 100 percent diffusion is accomplished by turning vertically projected sound waves into a horizontal and expanding plane—distributing sound equally in all directions. Heat generated by operation is carried off through the speaker grille around the dome. This principle of placing the speaker and deflecting dome in the top of the radio, utilizing the entire cabinet as an effective baffle, gives a brilliant tone with sufficient volume to fill a large room. A slide rule dial set in the front of the cabinet at a 45 deg. angle furnishes micrometer-like tuning. This is controlled through a knob at the top. A matching volume control knob turns the set on and off. The cabinet houses a powerful 5-tube AC or DC superheterodyne with a special enclosed DX loop antenna. Colors are ivory, walnut, ivory with brown top and knobs, and all brown.

(*See page 52*)

Designer: Barnes & Reinecke. Materials: Durez phenolic, Durez Plastics & Chemicals, Inc.; Beetle urea, American Cyanamid Co. Molder: Firestone Rubber & Latex Products Co. Equipment: Press, French Oil Machinery Co.; Tools, Firestone Tire & Rubber Company

★ ★ ★

General Electric Co.

The significant trend toward simpler, more functional styling and the reduction of gadgets is evident in the new G-E table model. Smallest receiver in the line (6 in. high, $9^1/_4$ in. wide by 5 in. deep), it has a horizontal straight-line dial along the top front edge, a louvered speaker grille extending across the face of the set and manual tuning controls at the bottom. Dial and speaker grille are related in a design of structural simplicity—soft flowing lines contrasted and balanced by sharp planes. Operated on either A.C. or D.C. current, the set has a 4 in. speaker, built-in antenna and a tuning range for standard broadcasts. Illuminated dial with large block, contrasting colored numerals is easy to read from any angle and is shielded by a transparent cellulose acetate window. It is mounted and adjusted on the chassis for final assembly for greatest economy. The louver type grille reduces possible additional costs for grille cloth and escutcheon plates and possesses good acoustical properties. It was so designed that the tool could be made in two parts, cabinet and grille, resulting in a considerable saving and also permitting future design changes of a major degree without altering the basic form. Mechanical properties—high dielectric strength, heat resistant, good impact, low cold flow, stability—compare favorably with other materials for these small radios. In addition to the ivory urea cabinet, the same model is made in deep mahogany phenolic. The simplicity of the design adapts the model for use in almost any fine interior, whether furnishings are period or modern.

(*See page 53*)

Designer: Gerald Johnson Associates. Materials: Plaskon urea, Plaskon Corp.; Textolite by General Electric Co. Molder: General Electric Co. Plastic Department

DECORATORS' ACCESSORIES

Alice Donaldson

Believing that hand work, original paintings or custom design could be machine finished and protected with all the beauty of laboriously applied Oriental lacquer, Alice Donaldson invaded the plastics research laboratory. The result is Plasdecor, a new laminated plastic which incorporates, in their original colors, a wide range of materials, textiles, paintings in urea laminated sheets. The resultant sheet is unaffected by humidity or temperature changes, is stainproof, hard-surfaced and permanent in finish, and may be made cigaret-proof and practically fire-resistant. Easily cut and machined, the laminate is available in different finishes or thickness from $^1/_{32}$ in. to 2 in. sheets up to 36 in. by 96 in. Decorations, or solid patterns or colors may be applied to both sides of a sheet. Thin sheets may be made translucent. Trays, a table top finished in laminated tiles, a large wall plaque of swatches of Peruvian fabrics in a Peruvian design and a tiny pin, are a few of the potential applications in many fields. For architectural purposes, there is an unlimited line of pigments and textures for doors, floors, baseboards, bathroom walls. Murals may be painted in any style or design, paintings printed without inlaying, to meet specific design demands. Ideal for veneering furniture, the material can be used for bar tops, bed headboards, buffet fronts, or medallions or accessories. Novelties—screens, valances, tie-backs, decorative plaques and trays, can be custom made.

(*See page 54*)

Designer: Alice Donaldson. Material: Beetle urea by American Cyanamid Co. Laminator: Plastics Department, General Electric Company

★ ★ ★

Elizabeth Arden

The three bears—frosted for dainty coolness and frisky in stance dramatically attract attention to the summer line of Arden cosmetics. Each animal, a separate unit, fabricated of translucent acrylic sheet, supports a single jar or bottle giving emphasis to the individual cosmetic overhead. The grouping serves to tie up the entire line with the prescribed beauty routine stressed by the manufacturer—an important sales promotion tactic for featuring advertised brands. Designs had to be distinctive to center interest in an overladen drug store window and yet simple enough so that the potential customer would not lose sight of the merchandise. Strength and stability were vital to uphold the weight of heavy jars and bottles and to withstand much handling and shipping. An air of soft femininity is created by spotting tiny pieces of white lace on the frosty acrylic. These imaginative units are sturdy enough for counter use as well as distinctive and smart window displays.

(*See page 55*)

Designer: Clarissa Gross. Material: Plexiglas, Röhm & Haas Co., Inc. Fabricator: Croasdale and De Angelis

J. M. Gordon & Co.

Deep-drawn cellulose acetate, fabricated into ingenious seasonable displays open a new field for this type of plastic sheeting. The technique of drawing acetate, long familiar for floating toys and five and ten cent items, has been extended to larger pieces, in which unlimited shapes and forms are possible. Both lighted and unlighted displays can be made and the incorporation of luminescent powder in the plastic sheet, creates unusual glowing highlights, particularly striking, when edge-lighted. Christmas specialties include a large two-piece ornamental ball, large in diameter and an oversized transparent star for a giant tree. In a "three dimensional" window display used by an Ansonia shoe store, an illusion of colorful fish swimming deep under the sea was created by cementing the drawn acetate plaques directly to the plate glass window. Wild geese, made with like craftsmanship, are used for hunting season and fall merchandise backgrounds.

(*See page 56*)

Material: Lumarith Sheet, Celluloid Corp. Fabricator: J. M. Gordon and Company

FURNITURE

Ypsilanti Reed Furniture Co.

Sturdy enough to withstand the wind and the rain—yet safely smooth for sheer hose and fine fabrics, woven plastic furniture replaces reed and rattan for porch and terrace. Made of extruded acetate butyrate strips and strands in an almost unlimited range of colors, the plastic weaving is woven by hand and by machine. Continuous lengths of any desired shape and in several diameters in translucent, transparent and opaque permit an endless variety of effects. (MODERN PLASTICS, April 1940, page 31). The translucent crystal screen and matched rustic lawn set shown are solid color but two-tone effects are possible. Rigorous tests to determine the plastic's resistance to heat, water and soot, three elements generally encountered by furniture that is used out of doors, proved that the material can take it. The finish is permanent and no amount of cleaning with soap and water will cause it to deteriorate. One settee designed for porch or terrace use is made of woven strands of the plastic in a salmon pink shade with cushions upholstered in a rough, textural fabric to blend. The settee separates to form two separate chairs. Plant stands, various sizes and types of tables, arm chairs and comfortable reclining chairs are now being made of this plastic that is rapidly replacing the fibrous materials so long in vogue.

(*See page 57*)

Designer: E. J. Houghton. Material: Tenite II, Tennessee Eastman Corp. Plastic extrusion: Detroit Macoid Company

Vazah Inc.

An elegant background for tempting *smorgasbord* or dainty h'ors d'oeuvres, a decorative occasional table of transparent acrylic is constructed without resorting to bolts, screws and other fastening devices. It is welded together by heating, bending and pressing the sheets to shape over forms. The table is easily transported from place to place by means of an upright ring in the center that serves as a handle. Sturdy and stable, it is equally practical on the terrace, or indoors. The top revolves without scratching to facilitate serving, and four shell-like, clear plastic dishes are furnished with the table for canapes, nuts and other delicacies.

(*See page 58*)

Designer: Cora Scovil. Materials: Lucite, E. I. du Pont de Nemours & Co., Inc. Plexiglas, Röhm and Haas Co., Inc. Fabricator: Vazah Incorporated

★ ★ ★

Mrs. G. Howard Davison

From an 18th Century sleeping chamber comes the inspiration for a contemporary inlaid "period" piece veneered with colorful cast phenolic sheets. In George Washington's files there is a document telling about the arrival of two such chests of drawers at Mount Vernon; Thomas Jefferson also ordered them for Monticello. In France, during the late Empire, similar pieces were inlaid with malachite and even smaller pieces of lapis. The use of the plastic achieves the effect of inlaid craftsmanship and individual styling and simultaneously provides all the protective qualities and permanent luster obtainable only with plastics. A marbleized brown cast resin covers the top, sides and drawer fronts. Bronze handles complement the plastic and the walnut finish of the mahogany. A shelf in the top of the chest pulls out to form a desk. Formerly used for storing wigs, it is ideal for linens or certain items of wearing apparel, or as an occasional drawing room piece.

(*See page 59*)

Designer: Mrs. G. Howard Davison. Material: Marblette by Marblette Corp. Fabricator: Master Woodcraft Company

HOUSEHOLD

The Brearley Co.

Calorie or health-conscious, modern homemakers regard the bathroom scale as essential equipment. An achievement in styling directed toward new beauty plus durability, the Counselor scale represents what is believed to be the first attempt to use plastics in this way. A streamlined cellulose acetate butyrate base in a rainbow array of colors has a tough surface that won't chip off, is resistant to scratches and steaming moisture. Shipping costs drop because of its lightweight and permanent finish. Petite in over-all size, the scale has ample footroom. The platform, with chromium trim, is covered with non-slip ribbed rubber which carries over the front rolled edge to afford additional protection and to enhance the rhythmic contour. A large magnifying lens covers the dial.

(*See page 60*)

Designer: Vytant Aleks. Material: Tenite II, Tennessee Eastman Corp. Molder: National Lock Company

★ ★ ★

Rich & France, Inc.

For the first time in nearly fifty years the lowly household broom has been made glamorous. Dressed up by gay red, green or blue variegated plastic hangers, and shoulders, with corn dyed in harmonizing shades, these cheerful pastel brooms met with immediate success. Over 5000 dozen were sold in the first eight weeks after their debut (MODERN PLASTICS, June 1940). Injection molded of cellulose acetate, shoulders and caps are economically produced—at the rate of every 55 seconds—four sets at a time on a single sprue. Primarily decorative, the brilliant shield not only protects the broom corn from breaking and snapping when bumped but will not scratch or mar furniture or woodwork which it may strike. The cap at top makes it easy to hang the broom out of the way when not in use. The slender handle of the broom coupled with the light weight of the plastic helps make sweeping less of a chore.

(*See page 61*)

Designer and Molder: Elmer E. Mills Corp. Material: Tenite, Tennessee Eastman Corp. Equipment: Jas. H. Matthews Co.; Reed-Prentice Corporation

★ ★ ★

Mueller Brass Co.

Hot or cold, a steady stream of water has no effect on this gay plastic shower head. Molded of a cellulose acetate butyrate, it will not absorb moisture, withstands hard wear, and color is all through. Its streamlined head is so constructed and its orifices so arranged that it supplies ample water for the shower without excessive volume. A special nickel-plated set screw centered in the adjustment head, at a twist of the fingers can be turned outward allowing the disks to separate slightly, disengaging them, allowing a larger volume of water to clear out lime, mineral salts and the serrations of any foreign matter which might clog up the holes. Injection molding facilitates low-cost and speed production—disks are produced at 8 per shot. A wide range of pastel tints to blend with bath accessories are available. The clear transparent model (pictured) is for demonstration only. Housewives who like to carry out detailed color schemes will like the pastel shades, but husbands who like to see how a thing works, will naturally turn to the transparent model. But whatever color is selected, a stimulating, invigorating shower

is assured, for the flow of the "needles" of water that stream through the head can be controlled. The shower head is constructed so that there is water aplenty, but no waste.

(*See page 62*)

Material: Tenite II. Designers: R. L. Comb, H. A. Husted. Molder: Thermo-Plastics Div., Standard Products Co. Equipment: Molds, Quarnstrom Tool Co.; Speed Nuts, Tinnerman Products, Incorporated

LIGHTING

The Miller Co.

A boon to the pianist, an efficient yet unobtrusive method of lighting musical scores on the instrument has been effected by the use of a louvered plastic material placed in such a manner that it in no way detracts from the design of the piano itself. A fluorescent tube, placed at the bottom and directly in front of the music rack where it will not block the musician's vision, is covered with a sheet of the plastic thus focusing the light rays on the music and eliminating all glare. The cold light of the tube will not warp piano action. When viewed from certain angles the plastic sheet appears to be opaque, but the fact that diffusing, opaque films of pigment are suspended in clear cellulose acetate sheet material not only accounts for this phenomenon but assures proper control of the light rays. Four standard colors of louvers are available: white, pink, ivory and black. The black is used in this application. Other colors are available to order.

(*See page 63*)

Designer: Gerald Johnson Associates. Material: Louverglass, Doane Products Corp. and E. I. du Pont de Nemours & Co., Inc. Equipment: The Miller Company

★ ★ ★

Lenart Import, Ltd.

Truly modern in design and material, the Shellflex lamp and shade have an airy lightness and luminosity achieved through a novel technique of forming the material. A continuation of the line of vases which have been so much in vogue during the last year, the unit is formed of cellulose acetate plastic, plasticized with a specialized solvent, and poured into a spun metal mold. The base of the lamp is spherical in shape, the lower half being encased in a brass shell to lend stability to the unit as well as contrast in materials. Designed so that the base and shade form a unified flowing line, the lamp contains a single lighting element that gives direct as well as indirect illumination with an agreeable semi-luminous character, shared by harmonious base and shade.

(*See page 64*)

Designer: Walter Loos. Fabricator: Joseph Mzarek. Material: Monsanto cellulose acetate

The Miller Co.

The light-transmitting and diffusing properties of embossed cellulose acetate sheet stock are put into action in a fluorescent fixture designed to provide a unit for architectural and decorative purposes that will retain its maximum lighting efficiency. Although thermoplastic, the cellulose acetate is suitable since fluorescent lamps operate at low temperatures. Ease of servicing and cleaning the fixture is made possible by the light weight of the non-fragile material, a decided advantage in keeping shipping and handling costs at a minimum. This flexible material is easily fabricated—no special tools or mold are required. Flat sheets are cut and bent to shape, and one stack serves as a source for diffusing panels of many different sizes and forms. By varying the design of the surface texture embossed on the surface of the panel, it is possible to obtain a range of light transmission.

(*See page 65*)

Designer: The Miller Co. Material: Monsanto cellulose acetate, Monsanto Chemical Company

★ ★ ★

John C. Virden Co.

Designed to be functionally efficient as well as attractive in appearance, the Fluorogrill, a fluorescent lighting fixture, incorporates plastics wherever possible. Four important and necessary factors caused the designer and manufacturer to turn to plastics as standard material: light weight was a primary consideration from the installation and shipping standpoints; flexibility entered the fabricating and manufacturing angle; proper transmission and diffusing properties were indicated for exact light control; while the maintenance problems called for a durability to withstand handling and cleaning. Molded urea provides a creamy translucent surface for the side panels as well as for the circular pieces that are slotted and fitted into one another to form a surface similar to the "egg-crate" designs. These circular rims distribute the light, baffle the glare, and hide the lamps.

(*See page 66*)

Designer: Norman H. Vacha. Material: Plaskon, Plaskon Co., Inc., Textolite, General Electric Co. Fabricator: John C. Virden Co. Equipment: Plastics Dept., General Electric Company

MACHINERY & APPLIANCES

General Electric Co.

Severe specifications for a 5-pole, panel type electrical contractor for a magnetic switch have been met by a molded plastic shaft and a cold-molded arc chute. This circuit breaker is the type commonly used in magnetic switches to start, stop and reverse motors generally operated across the line. They are

used on voltages up to 600 and motors whose full load currents run up to 50 amperes. Both the switches and the motors are used in a wide variety of applications. A typical example is that in connection with machine tools. In machine tools, it is often necessary for the switches to operate many millions of times, to be placed in very crowded quarters, and to require an absolute minimum of maintenance and servicing. The increasing trend in recent years toward more extensive demands on apparatus of this kind makes it necessary for switches, built for such applications, to be reliable, compact, simply constructed, durable and versatile enough for certain accessory combinations. The molded shaft used in these switches combines in a single piece of material the following parts and functions: bearings on which to rotate an assembly of parts; support for magnet armature; individual bearing, stop, guides and barriers for each of 5 contact tips (3 in short form); guides and barriers for each of 5 flexible braid connectors; spring seats for each of 5 movable contact tips; molded arms with which to operate up to 7 auxiliary switches (5 in short form) that may be used in the final application; molded arms with which to operate mechanical interlocks; complete high quality insulation for all of the above parts.

The fact that these functions are combined in a single molded part helps make this switch meet the stringent specifications. There is no opportunity whatsoever for loosening of parts as might be the case if they were assembled by screws and lock washers or rivets. This assures permanent maintenance of factory adjustment as well as long life because of the complete absence of loosening and pounding. The material itself is of high quality insulation permitting the closest possible spacing of the parts that must be alive, such as contact fingers and connectors. It cuts down on the friction of the main bearings and eliminates corrosion and lubrication troubles. In one molding operation, it is practical to secure: barriers that accurately dovetail with stationary parts and help produce almost completely isolated poles; accuracy of alignment and uniformity of production independent of assembly fixtures and judgment or skill of operators. All of these functions are made possible at a cost little more than that of making a simple support on which to assemble separate barriers, tip bearings and guides, connector guards, operating arms for auxiliary switches and mechanical interlocks and separate insulation. Besides the molded plastic shaft, the switch also has a cold-molded plastic arc chute which confines the arc and prevents any damage, as this material will not be burned or carbonized by the hot arc.

(*See page 67*)

Designer and Molder: General Electric Company

★ ★ ★

Plastic Products Co.

Hand-fashioned wooden paddles used in the automotive industry for spreading body solder bow out to sturdy, handier and cleaner molded phenolic plastic paddles. Designed with a fountain handle to hold the lubricating oil, the paddles are molded in four shapes scientifically designed to reach all curves and surfaces encountered in body work. The new plastic paddle will not score as did the wooden types, will not absorb oil, and they withstand the high temperature of softened lead without sticking. The tool does a smoother and better job in less time while saving materials such as lead, buffer disks and files. It has a sturdy phenolic handle with a transparent molded cellulose acetate filling cap, and with a paddle inserted it measures 10 in. in overall length. Two or three drops of oil are sufficient to do the ordinary leading job. Each press of the valve brings a drop of oil which lubricates the bottom of the paddle. One complete model has been made completely of clear methyl methacrylate. The journeyman now has an opportunity of overcoming his makeshift methods of smoothing body solder.

(*See page 68*)

Designer: Victor A. Fallier. Material: Bakelite by Bakelite Corp.; Lucite by E. I. du Pont de Nemours & Co., Inc.; Tenite by Tennessee Eastman Corp. Molder: Chicago Molded Products Corp. Fabricator: Colonial Kolonite Company

★ ★ ★

M. W. Jenkins Sons, Inc.

Going behind the scenes in the textile printing industry, we find furnisher brushes now bristling with synthetic organic plastics. Used for conveying dyes from shallow vats to engraved rolls which in turn print designs on cloth, these brushes now have bristles of man-made monofilament. Formerly, the tempico fiber obtained from Mexican cacti was employed, but brushes of this material lasted from only two to eight weeks. In contract the new brushes resist the abrasion as well as the various chemicals, dyes and acids encountered in the operating processes. As a result, brushes have now been in operation for over eight months without any signs of breakdown. Bristles are strong, elastic and uniform in diameter, will not split or become brittle. Because the plastic bristles absorb practically none of the dyes and resist dye solvents, they can be washed quickly and used in more than one color without danger of bleeding.

(*See page 69*)

Material: Nylon, E. I. du Pont de Nemours & Co., Inc.

★ ★ ★

Hussman-Ligonier Co.

Aiding in the preservation of perishable foods, large molded phenolic door frames and rails are now being used on commercial refrigerators where strength, shock resistance and foolproof insulation are required. A range of five different sizes of door frames, permanent in dimension—19 in. by 28 in.; 19 in. by 25 1/2 in.; 19 in. by 20 3/4 in.; 14 1/2 in. by 25 1/2 in.; and 14 1/2 in. by 28 in., as well as rail lengths of 40 1/4 in.; 49 3/4 in. and 54 3/4 in. are now being produced in quantities. Designed to withstand the repeated impact encountered in being continually slid back and forth without losing in dimensional stability, the door frames and rails also provide insulation. Grooves are molded into

the door frames, while the rails are reinforced with horizontal ribs to guard against severe impact. The hollow construction of the units combined with the intrinsic light weight of the plastic combines to keep handling and shipping costs at a minimum. The lustrous appearance is not dimmed by repeated washings. For complete description see MODERN PLASTICS, September 1940, page 44.

(*See page 70*)

Designers: J. L. Howie, Jr., W. B. McMillan, W. H. Grant. Material: Bakelite phenolic, Bakelite Corp. Molder: Grigoleit Company

NOVELTY & MISCELLANEOUS

Tri-Pak Gun Kit, Inc.

Transparent, unbreakable lubricating oil containers are gratifying customers and delighting the manufacturer. For four years the company has been merchandising their oil in glass bottles, but troublesome breakage, high freight costs and an unimpressive sales record caused them to look for another packaging material. The selection of cellulose acetate butyrate, injection molded for economy meant a tough, moisture-proof material which would be unaffected by the lanolin and sperm base oil. The container is still transparent; it is unbreakable and has a definite "visual" appeal. Since the weight is approximately 20 percent of that of the glass container, there is a considerable saving in shipping costs. Because of the unique design of the bottle, outlets have been secured in many stores that, heretofore, never handled this type of merchandise. The label is printed on .005 gage, clear acetate sheet and placed inside the container for permanence.

(*See page 71*)

Designers: Hanson and Danielson. Material: Tenite II, Tennessee Eastman Corp. Molder: Remler Co., Ltd. Fabricator: The Dobeckman Co. Equipment: Injection molding machine, Reed-Prentice Corporation

★ ★ ★

The Gibson Art Co.

Sentimental sentiments wear a new face. Molded plastic appliques, designed to modernize greeting cards, present an intriguing three-dimensional appearance that catch the shopper's eye. Reminiscent of the handmade valentines of lace and fancy attachments, these injection molded acetate forms are really different and produced at surprisingly low cost. Seasonal cards, as well as cards for special events such as birthdays, anniversaries and convalescent wishes can be decorated with the appliques in various colors and designs to suit the greeting. Animals, boats or flowers are used and movable gadgets add interest.

(*See page 72*)

Materials: Tenite, Tennessee Eastman Corp. Plastacele, E. I. du Pont de Nemours & Co., Inc. Molder. Belmont Molded Plastics, Inc. Equipment: Grotelite Company

Schick Dry Shaver, Inc.

For streamline whisker whipping, the 1941 line of Schick Shavers combines the colorful beauty of molded urea with good design and engineering. The two-piece molded case, self-insulated against shock, is rough and ready for wear and washing. A bead of plastic material is used as a seam between the cover and back of the case to take care of the natural warpage. An interesting design detail is seen in the way that the fluted lines of the shaver are continued as the motif of the electric plug, thus assimilating these two units and giving finesse to the conception. The fluted or corrugated surface not only has an esthetic value, but it provides a perfect grip. The shaver has been developed in two color combinations: rich, mellow ivory offset with gold trim and identified by a maroon and gold nameplate, and a second model with silver trim. Nameplate is an enamelled metal disk encircled by a raised molded plastic rim. Important features are a larger motor and the manner in which the "Whisk-its" are integrated into the design unity. Formerly they appeared as a kind of imposed or added "cup" that had little relation to the general form. In the new models the "Whisk-its" have been made an actual part of the design following the curve of the shaver.

(*See Page 73*)

Designer: Raymond Loewy. Material: Beetle, Beetle Prod. Div., American Cyanamid Co. Molder: Shaw Insulator Co. Machinery: Newark Die Co., Incorporated

SCIENTIFIC

Colgate-Palmolive Peet Co.

A laboratory unit, completely constructed of transparent acrylic material, and used for the recovery of soluble salts or acids from colloidal dispersions, hides nothing from the observer. This continuous laboratory dialyzer consists of two thick horseshoe-shaped ends between which 11 concentric plastic rings are located. Between each two rings of the unit is placed a membrane of either cellophane, parchment or other suitable material. The solution to be dialyzed is led into a manifold at the lower left-hand corner of the unit and flows continuously in the even-numbered cells. The recovery solution, usually water, is led into a manifold in the upper left-hand corner of the unit, and flows continuously through odd-numbered cells. Recovery, or purification, is effected by transfer through the membranes, between the cells. The information obtained from this unit will give an accurate indication of what may be expected from any continuous dialyzing set-up on a production scale. It will also indicate the amount of equipment required for a given problem of recovery or separation. The unit is an ideal dialyzer for experimental use where the plastic is inert to the solution to be dialyzed.

(*See Page 74*)

Fabricator: Brosites Machine Co., Inc. Material: Lucite, E. I. du Pont de Nemours & Co., Incorporated

Movie Mite Co.

Sound movies—at home or on the road! A portable sound movie projector that is tops in performance and low in price is now made possible through the use of plastics. Selling for only $175.00 and weighing 26 lbs., the machine is ideal for home or club use or for showing advertising and business films. Each case carries a built-in projector, amplifier, speaker, screen, take-up, reel and there is still room for three 400-foot reels of film.

The amplifier base is the outstanding application of plastics in the projector. Since the machine has to operate on both A.C. and D.C., external insulation was necessary to protect the operator from electrical shocks. High-gain amplifying circuits require electrical shielding to prevent interference from external generators of radio energy. A plastic housing for the amplifier provides insulation and does double-duty as a base for the projector. Interior of the housing was molded rough by using a sand-blasted mold force. Molten metal sprayed on the inner surface produces a coating that serves as a "shield." By molding the socket recesses as an integral part of the amplifier base, low-cost assembly and high efficiency were effected. Side holes for the photo tube and the power plug are also included. Bosses and inserts are molded in place for mounting the many internal parts; this eliminates additional assembly labor. Through the use of plastics for the amplifier base, the weight and bulk are reduced approximately 20 percent.

The cam is molded of a graphitized compound which, it is said, will outwear metal and will not interfere with sound from the speaker. The lamp socket and photo tube cover are also molded providing adequate temperature resistance and quality electrical insulation. Inserts are molded in place. A large idler gear which transfers power from a small hardened steel pinion to a die case socket gear is fabricated from laminated phenolic material that is mechanically non-resonant. Vibration and noise are reduced to a minimum in the gear train. Laminated bushings, washers and pulleys are among the other parts that require little oiling and which reduce frictional noise. Easily operated and as efficient as machines that cost three times as much, this sound movie projector would have been impossible without plastics.

(See Page 75)

Designers: Mechanical—Wm. G. Wilson, Plastics—J. H. DuBois. Material: Textolite, General Electric Co., Plastics Dept. Molder: General Electric Co. Laminator: General Laminated Products Company

★ ★ ★

National Foot Appliance Lab.

Sanitary, lightweight, comfortable-to-wear, custom-made arch supports of cellulose acetate butyrate are finding a wide acceptance among men, women and children (MODERN PLASTICS, August 1940, page 32). Replacing bulky rubber, leather and steel supports, these devices, perfect in fit, are made to individual requirements from a plaster-of-Paris impression of the foot made in the doctor's office. Corrected plaster molds are made which are used to form the support from specially molded sheets, cut to size, shaped under heat and pressure. Odorless, low conductors of heat, resistant to discoloration, tarnish, stains and moisture, the supports are smooth, pleasant to the touch and will not tear sheer hose. They are available in colors and will not cause skin irritation. Several types of supports can be made and by dipping them in warm water, practitioners can make minor adjustments.

(See Page 76)

Designer and Fabricator: National Foot Appliance Laboratory. Material: Tenite II, Tennessee Eastman Corp. Molder of sheets: Insulation Mfg. Company

SPORTING GOODS GAMES AND TOYS

Reuhl Products, Inc.

Hobbies which make grown-ups feel young and develop children along sensible adult patterns keep pace with a changing world. Interest today is centered in fields of action. Building and racing model boats are one of the most popular, and now comes a real motor-driven hydroplane with a bright crimson molded plastic hull. Up to the present time, boats have been manufactured either out of pressed steel or wood, or from both materials combined. The faults, from an economical viewpoint, in this type of manufacturing, are a multiplicity of operations that proved costly on a resultant product that possessed neither the necessary strength for gas motor operation nor permanent color appeal. The novelty sales appeal was added with the plastic hull, and strength, durability and lightness in weight that are important considerations as far as the hobbyist or serious youngster is concerned. He likes models that will actually go at a clip—and will not fall to pieces after the "trial run."

(See page 77)

Designer: Andreas G. Reuhl. Material: Bakelite phenolic, Bakelite Corp. Molder: Plastics Engineering Co.

★ ★ ★

Gallant Knight, Inc.

Age old, the game of chess takes on new life with handsome, intricate playing pieces. Injection molded of ivory and red cellulose acetate, the chessmen are correct in size and proportion, easy to identify, pleasantly smooth, permanent in color and finish. Expert and novice alike are pleased with the precise outlines, durability and clear brilliance. Economy of quantity manufacture (no lacquers or paints are needed), light weight and the fact that they are less fragile on dealers' shelves, as well as in shipping, add to their sales appeal. The set is well designed and at least 75 percent of the seams often objectionable in light colors is eliminated.

(See Page 78)

Material: Tenite, Tennessee Eastman Corp. Molder: Ability Mold and Die Works

Harmonic Reed Corp.

The harmonica boys will be "swinging out" from now on with the first successful American-made, plastic harmonicas. Heretofore, all attempts to make harmonicas in this country resulted in high costs and not very good instruments. Formerly, it was necessary that all musical reeds be hand and ear tuned requiring a high degree of skill at low cost. Now, with the patented replaceable reed and the development of automatic machinery for manufacturing reeds in large quantities, perfect pitch is no longer an expensive stumbling block. The use of plastics makes several important advantages possible: the mouthpiece is now smooth, preventing bruised and infected lips—the instrument can be thoroughly cleaned in hot water without any damaging effect on the tone quality or the appearance. There is a complete absence of air leaks. A fine tonal quality is present regardless of temperature or weather conditions. The slots for the replaceable reeds remain tight continuously.

(*See page 79*)

Material: Bakelite phenolic. Molder: Specialty Insulation Mfg. Co., Incorporated

STYLE AND FASHION

S. Buchsbaum & Co.

An elastic plastic! Accessory items, such as belts, garters and suspenders, are now being made of this transparent vinyl-derived material called "Elasti-Glass" that stretches and yields with body movements and returns to its original shape slowly without "snap." Naturally transparent, the material is made from a chemically inert plastic sheet which will not oxidize, crack or deteriorate. Its water absorption is low, and, depending on the plasticizer used, it can be made resistant to oils, greases, gasoline and alcohol. Being thermoplastic, it can be bonded to itself permanently by a simple, rapid, heat-sealing operation. Cleaning is relatively simple. Various ribbed designs and other such features can be employed to give the accessories added sales appeal.

(*See page 80*)

Designer: S. Buchsbaum & Co. Material: Vinylite, Carbide and Carbon Chemicals Corporation

★ ★ ★

Saks Fifth Avenue

Lovely to look at and even lovelier to wear, the Cinderella-like shoes with uppers of sheet plastic material are causing quite a furore among the ladies. Made of a highly plasticized vinyl-derived material that is highly flexible and elastic, the shoes are in the height of style now, and it is evident that they are destined to be long-lived. Reported (MODERN PLASTICS, August 1940, page 34) to be the first synthetic fabric to be elastic and permanently resilient, at once waterproof and not susceptible to oxidation, its practical advantages lie in these qualities as well as in its ruggedness and chemical inertness. The sheeting used in daytime shoes is 0.040 in. thick, and may be used plain, draped, embossed, perforated and stitch-trimmed. The edges may be cut, hemmed or bound, and the material in clear or in colors is used in combination with leather, suede, kid or cloth. Besides its beautifying aspects, the plastic is perspiration- and scuff-proof, does not crack, and is comfortably elastic for form fit.

(*See page 81*)

Designer: Saks Fifth Avenue. Material: Vinylite, Carbide and Carbon Chemicals Corp. Fabricators: D. La Valle, Seymour Troy

★ ★ ★

McCoy, Jones & Co., Inc.

Smartly styled with an eye toward good taste as well as practicality, "Exylin" vinyl-derived wearing apparel—raincoats, smocks and smockettes, and make-up capes—are sleek, smooth and comfortable to wear. Designed to drape well in addition to offering protection, the garments are lightweight, waterproof and resistant to cracking and deterioration. Collars, panels and other areas that have to withstand considerable handling are made of a heavier gage plastic than that used in the body of the apparel. Reinforced seams give added strength. Available in translucent and transparent colors, both fashionable and serviceable.

(*See page 82*)

Designer: McCoy, Jones & Co., Incorporated. Material: Vinylite, Carbide and Carbon Chemicals Corporation

TRANSPORT

Geo. W. Fleming Co.

Calm seas or stormy weather—salt water corrosion and electrolytic action work havoc with marine apparatus. To overcome these foes of smooth sailing, the Fleming bilge pump is completely housed in molded phenolics (MODERN PLASTICS, July 1940, page 39). Possessing high dielectric strength, water, oil and abrasive-resistance, the 10 in. high case is molded with such accuracy that no machining operations are needed. Full protection for the flat and large screening area is incorporated. There is an appreciable reduction on the assembly cost with the result that sales are far ahead of those on metal pumps. A spherical type of bearing is used that is self-aligning and oil-impregnated. These bearings are slotted and the slot fits over a boss molded in one-half of the case. The other half has a molded recess into which fits a felt-saturated pad in back of the top bearings for further lubricating them. The inlet of the pump has screen areas molded into the plastic case. The whole unit is held together by 6 screws;

an important component is the sway-proof switch which goes into action when the water rises to one inch and keeps pumping until all water is forced out.

(*See page 83*)

Designer: Frank J. Fleming. Material: Durez, Durez Plastics & Chemicals, Inc. Molder: Oris Manufacturing Co., Inc.; Connecticut Hard Rubber Co. Equipment: Hoggson & Bettis Mfg. Company

★ ★ ★

Glenn L. Martin Co.

Laminated plastic trim tabs developed for use on ailerons, elevators and rudders of airplanes combine the valuable features of lightness and strength. These plastic tabs are to be used in place of metal or fabric parts. The basic purpose of the tab is to relieve the pilot of unnecessary forces on the normal flight controls. The tabs are adjustable from the cockpit and by varying their setting, relative to the surfaces to which they attach, the pilot is able to balance the airplane for various conditions of flight, such as cruising, climbing or gliding, without continuously exerting appreciable forces on the control column and rudder pedals, which becomes very tiring. The laminated phenolic fabric base structure of the tab is only half the weight of aluminum and on strength tests has far exceeded specifications established for metallic tabs. The resiliency of the laminated structure causes the tab to keep its shape under stress where the metal parts are often permanently distorted. The smooth uninterrupted surface of the plastic tab offers many advantages over a metal tab having projecting rivet heads or overlapping seams. Moisture does not affect the material and it is not subject to corrosion. The flat strengthening bulkhead inside the tab increases very greatly the rigidity of the exterior surfaces; provides an attachment and supporting surface for the hinges, control horns and similar parts. It is made integral with the exterior part of the tab so a strong homogeneous structure is produced. Moreover the use of plastics eliminates many operations formerly necessary when metal was employed. At present, metal counterparts are still being used in active airplane models as shown. One laminated unit is pictured with finish left off one end to show details of molding.

(*See page 84*)

Designers: Geo. W. de Bell; William Rose; Joseph Parrish. Material Suppliers and Fabricators: Formica Insulation Co.; and Taylor Fibre Company

★ ★ ★

Chrysler Corp.

Increased use of molded plastics in the modern automobile is indicated in the cellulose acetate butyrate instrument panel and door trim on the new Chrysler New Yorker model, which blends with the upholstery and accessories of the smart interior. Uniform texture, stability, color plus economical "short cycle" injection molding are major advantages. A new effect, secured by plastic inlays, is achieved by employing gleaming metal pieces imbedded in the plastic itself. An additional decorative note is the use of matching narrower panels on the doors to give an all-around, extended effect. The use of a plastic instrument panel is highly practical since it will always retain its rich appearance and has no surface finish to chip or wear off. Plastics have long been used in the automotive industry for steering wheels, control knobs, handles and laminated gears for noiseless timing mechanisms.

(*See page 85*)

Material: Tenite II, Tennessee Eastman Corp., Plexiglas, Röhm & Haas, Inc.; Sheller Mfg. Co.; U. S. Hard Rubber Co. Designer: Chrysler Corp. Inlay Work: Plastic Inlays, Inc. Equipment: Garman Tool Co.; Beyer Machine & Tool Co.; Meilsel Machine & Tool Co.; Fretag Manufacturing Co. Fastening devices: Tinnerman Products Inc.; International Screw Co.; Pall Nut Co. Injection Presses, Reed-Prentice Corp.; Index Machinery Company

SPECIAL AWARD

M & M Wood Working Co.

Completely changing the status of plywood as a structural material the Twentieth Century development of resin-bonded plywood has opened up brand new fields and expanded the former market (Modern Plastics, February 1940, page 23; May 1940, page 27; July 1940, page 25). Although plywood as such dates back to the Egyptians, the use of plastic resin as a bonding agent is sensationally new. Panels are made by spreading a solution of phenol formaldehyde on both sides of core veneers which are placed at right angles between the back and face of panels. The plywood "sandwich" is then inserted in tremendous hot plate presses, the moving parts of which weigh 75 tons. With the application of heat and pressure, the phenolic is fused into an inseparable plastic bond that is not affected by moisture, temperature, acids, solvents, mold or fungus. Weather, salt water, freezing or steam have no effect. Panels are stronger than steel by weight, permanent fire-retardant and excellent insulation. For varied architectural treatments the phenolic bonded plywood lends itself to rounded corners and large smooth unbroken surfaces. The potential uses of this plastic are tremendous. Among the present applications are exteriors of homes (2) and industrial buildings (1) boats (3) concrete forms, outdoor signs (4) airplanes, truck and bus bodies, farm silos and water troughs. The use of plywood as concrete forms during the construction of the Narrows Bridge on Puget Sound, Tacoma, Wash., (5-6) represents a good example of the strength and durability of the material. Panels were bolted together to the proper size and the concrete poured in. After the concrete had set the forms were "cracked off" and the plywood forms were re-used. These forms, re-used as often as 15 times were submerged for 93 days in salt water and yet were intact and usable when the job was completed. Developments and applications of this material will be watched with interest. (Numerals refer to pages below.)

(*See Page 86–87*)

Material: Resnprest (Durez Bonded Plywood), Durez Plastics & Chemicals, Inc.; M & M Wood Working Co.

Honorable Mentions

CLEARLY defining the marginal zone which differentiates Top Award Winners from the Honorable Mention group is a task of difficult solution. The line of demarcation is very fine, frequently indistinguishable. Judges have been seen with furrowed brow and completely perplexed expressions when faced with the critical task of marking one entry for a Top Award and according an Honorable Mention to its next-door neighbor. But the products selected for Honorable Mention are not mere "extras" in supporting roles to the star players. Rather they are jobs well done, with particularly noteworthy points of excellence and deemed outstanding for significant, meritorious achievement.

Perhaps the design or the use of the plastic lacks something in the execution, construction or styling, or it may be that the item itself judged on a composite merit basis does not represent a sufficiently startling advance to warrant highest honors; still the potentialities of the product are such that it cannot go unrecognized. No arbitrary limit is placed on the number of Honorable Mentions which are granted in a given classification. In categories where there were a number of praiseworthy examples, the judges did not hesitate to single them out. On the other hand, if it was felt that sufficient distinction or substantial contributions to plastics development were not obvious, no Honorable Mentions were considered.

While not qualified as "all around" prize winners in all respects, very often entries cited for Honorable Mention Awards possess the greatest commercial possibilities. They are always indicative of new trends, and represent milestones along the highway of plastics accomplishments.

1

HONORABLE

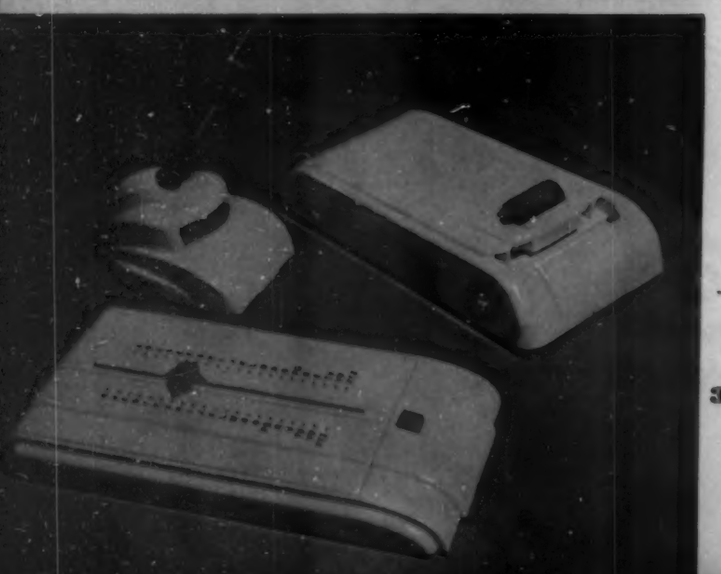
1. *To W. L. Stensgaard & Associates, Inc.*

for translucent cast plastic bas relief plaques. Each plaque measuring 11½ in. square by ⅝ in. deep in relief, is an original animal or bird design created and carved by the Stensgaard staff. Sprightly gazelles, threatening bulls and big-beaked grotesque birds are among the motifs. A new medium is used for the units. Liquid cast resin, mixed with another fluid, is poured cold into a latex mold which in turn is set in plaster. The material hardens without heat. In creamy white that ranges in tone from translucent to opaque, units can be finished in lacquer or oil colors. Remarkably effective for display and store decoration, they are interesting in modern rooms where the monotony of large wall areas is to be broken without introduction of a clashing note. Even flush panel doors are given a focal point by an integrally mounted plaque. In commercial interiors as bar backs, screens, window settings and valances, a softly subdued light effect can be obtained by rear illumination. Designer: Robert Von Liski. Original carving by Carl Halsthammer. Materials: Cast resin, Monsanto Chemical Co.; Catalin, Catalin Corporation

2

2. *To W. A. Sheaffer Pen Co.*

for a unique interpretation of cast phenolic resins in a comprehensive line of fountain pen stands. Relying solely on the rich colors and luster of the plastic, the designs do not attempt to imitate older materials such as onyx or glass. Metal has been combined with cast resin to highlight and set off the color. Interesting designs are obtained by the use of translucent material placed over a black base with details showing through. The smoky star-studded effect creates a feeling of infinite depth and permanence. Specially poured, the casting is shaped to form. Sets including bases, blotter holders, cellulose nitrate pens and cellulose acetate letter-openers were designed by Wm. Anton Lang and Ned Fish. Molds and injection molding: Worcester Moulded Plastics Co. Materials: Monsanto Chemical Company



3

3. *To Zephyr American Corp.*

for a matched set of streamlined handy desk accessories. The Autodex, first to be produced, was designed to replace old methods of hunting for desired numbers. By a simple push of the lever to the letter desired, then a slight pressure on a button, name, address and phone number are available at a glance. Sales reported to be over one-half million, although at a higher price than a simple metal unit, are a fair indication of the success of the colorful plastic case. Moreover, the mold is reported to be breaking all records for continuous operation. The Thermodex combines a room thermometer, paper weight and fountain pen holder in a neat one-piece three-deck housing. Completing the trio, is the Rollodex, not yet on the market. A convenient dispenser for scrap paper, it conceals a pack of loose sheets with

MENTIONS

no danger of any scattering at sudden drafts. A flip of the roller and a fresh sheet of paper is right on hand. In black, walnut, and ivory. Designers: Richmond L. Chipman; A. Edward Pollock. Material: Beetle, Beetle Products Div., American Cyanamid Co.; Plaskon, Plaskon Corp.; Bakelite phenolic, Bakelite Corp. Molder: Universal Plastics Corporation

4. *To Dr. and Mrs. Eric L. Alling*

for their superb execution of sculptured cast-resin figures. Produced in inexpensive non-metallic, rigid molds, these items represent some of the finest work that has been done in this direction. Two saucy fishes, design motifs for a pair of cast phenolic bookends, are typical of the fine artistic caliber of the castings. A polished velvety finish is achieved by casting the pieces in molds of which the chief ingredient is sulphur. These molds were developed to avoid the inaccuracies and poor surface of rubber molds. Quite adaptable for use as ornaments, the sculptured pieces, made of deep natural-looking brown, are heavy enough to support books of good size, and possess a translucency that adds to their whimsical charm. Material: Catalin Corporation

4

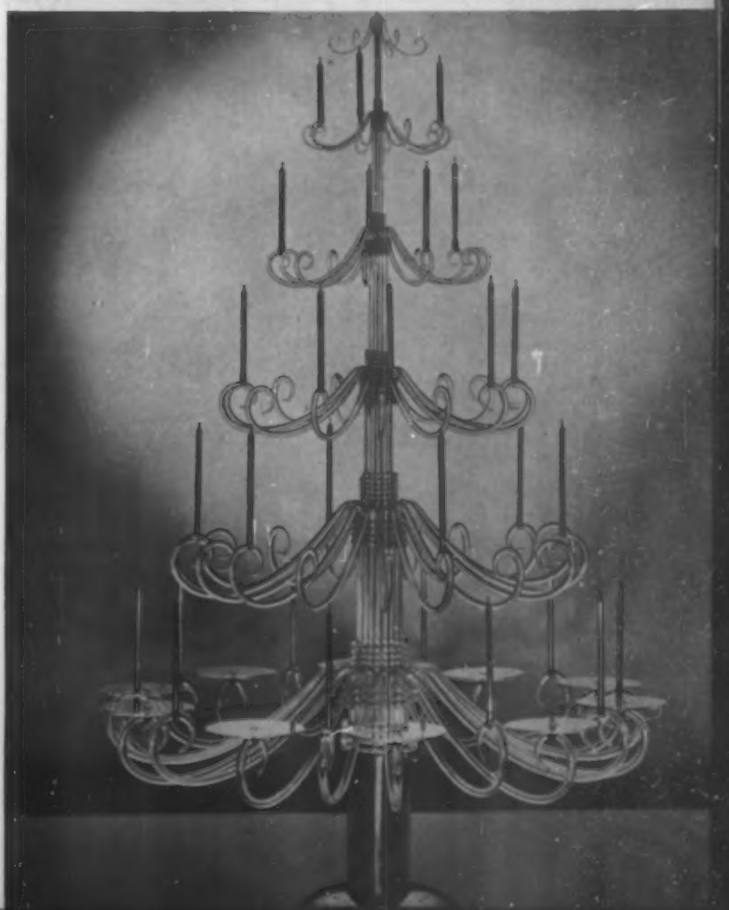
5. *To C. K. Castaing Studio*

for the smart modern candle holder fabricated of acrylic plastic. Practically designed so that wax from the candle will not drip on the table, the holder will complement any table set with the most exquisite of china and silver. A thick piece of the material is used and this is bent back over the base to form an arm for supporting the candle. Because of this thickness, none of the peculiar brilliance of the acrylic is lost, and any semblance of "skimping and cutting corners" on production is entirely avoided. The fact that the plastic will not tarnish or stain, also that it is more resistant to breaking than crystal, makes it highly appealing. Material: Plexiglas, Röhm and Haas Co., Incorporated

5

6. *To Scheuer Art Metal Mfg. Co.*

for their sparkling Christmas tree made of slender rods of acrylic plastic to simulate the evergreen. Almost Gothic-like in character, the tree is made of dozens of rods each of which forms a branch and supports tall silver candles. Ideal for displaying merchandise, or for adding a sophisticated decorative note to a holiday setting, the tree is solidly constructed and is impervious to wear. The fact that there is no enamel or finish to chip or wear off is a big selling point as far as the stores are concerned. Decidedly ornamental, the tree might be very attractive against the proper residential background. Designer: Clemens Scheuer; Material: Lucite, E. I. du Pont de Nemours, Inc. Equipment: U. S. Electric Tool Co.; Walker Turner Co., Inc.; Production Machine Co.; Abrasive Products, Incorporated



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HONORABLE

7. *To Heiberg Mfg. Co.*

for the sophisticated lady with hands outstretched for displaying cosmetics and the "Snoody Twins," ultra-modern displays made of clear acrylic sheet material with colored trim of cast phenolic. Designed for showing merchandise at point of sale, the displays exhibit an ingenious and clever use of the plastics, with a fringed effect for bangs on the lady's "hair-do," and puffed cheeks and pigtails on the wide-eyed children models. The materials have been combined to produce units that are simple, but smart and attractive. The cosmetic piece is svelte and chic and ideally adapted for "name" brand cosmetics. The boy and girl twins are practical, though decidedly cute. Each one has a little tray made of the clear plastic to hold lilliputian accessories and may be used as highlights among a more elaborate presentation of children's clothing. Because this display is light in weight, the shipping costs are kept at a minimum. Department store managers and window dressers appreciate the fact that the plastic sheet material is practically unbreakable. Unlike many displays that consist of mere rods and sheets bent and twisted into intricate shapes, these displays incorporate the personalized touch that is always a "go-getter" for sales. Designer: Malvina Matthews. Materials: Plexiglas, Röhm & Haas Co., Inc.; Catalin, Catalin Corp. Equipment: Sears Roebuck and Co. Frank Maxwell Co., distributor

8. *To Accessory Timepieces*

for a unique seven-day clock housed in an elegant case of crystal-clear methyl methacrylate. Remarkable for the simplicity of line and form and the impression it gives of being suspended in a shaft of light, the whole treatment represents a beautiful and sympathetic handling of the plastic. The 11-jewel movement is a visible decorative feature as well as an essential working part of the mechanism. A simple, brushed gold dial with smoky blue enameled hands complements the richness of the material. Possessing an ethereal quality, the clock is an embodiment of modern charm plus quality and fine workmanship. It will be a welcome addition to any fine interior. Designers: Camille H. B. Lehman, William Kimbel. Materials: Lucite, E. I. du Pont de Nemours Inc.; Plexiglas, Röhm & Haas Co., Inc. Fabricator: Swedlow Aeroplastics Corporation

9. *To Barton Corp.*

for their molded phenolic washing machine agitator which is easy on clothes and setting new records for endurance. Clean, smooth, lustrous, with a non-abrasive surface that is not impaired by the use of strong washing soaps, alkalies and caustic solutions, the agitator is permanent in color. Considerable savings in production costs were effected by the elimination of machining and buffing operations usually required for metal. Lightweight, the agitator has withstood tests equal to about 30 years of actual service in the average family. Boiling water does not affect the plastic and its dimensional stability is reported to be eminently satisfactory. There are two models, five different colors have

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been developed and the company reports that it is working on two additional plastic parts for its 1941 washing machine. Designer: The Barton Corp. Material: Bakelite phenolic, Bakelite Corp. Molder: Eclipse Moulded Products Co. Equipment: Hydraulic compression press, Williams, White & Company

10. *To Lacy-Behan, Inc.*

for throwing a life-line to those poor unfortunates whose lot it always is to make bad coffee. The "Coffex," a cold water coffee extractor, is a compact unit that is simple enough for the most flustered novice. It produces a clear, sediment-free beverage, uniform in flavor for each fresh pound. Plastics are used both inside and out. Three intricate polystyrene parts, formerly made of metal, make up the unit. Impervious to fatty acid, vegetable oils, wax and gases found in coffee, the plastic is unaffected by action due to electrolysis or galvanism, absorbs little moisture and does not change the taste of the extract. Extremely odd shapes, light in weight and almost unbreakable, were produced with ease. Handles and knobs are made of a cast phenolic. Designer: Harold M. Behan. Materials: Bakelite polystyrene, Bakelite Corp., Catalin, Catalin Corp. Molder: The Richardson Co. Equipment: Uptown Tool Works; Chicago Impression Die & Mfg. Co., Injection press, Reed-Prentice Corporation

11. *To Colorvision Ads, Inc.*

for three-dimension interchangeable injection molded acrylic letters on outdoor and indoor signs. Measuring 3 in. high, $^3/_4$ in. deep with $^1/_4$-in. stroke, these letters, mounted on edge in a metal stencil which exactly fits the individual letters, are illuminated by a fluorescent tube. There are no ugly cross-overs at junction points to mar the appearance. Geometrically exact, they are brilliant and clear, and at a distance of 150 ft. 3-in. letters appear to be at least 5 in. in height, because the aura emanating from the fluorescent tube seems to extend beyond the borders. Sides are sandblasted for light control. Rigid and durable, they can stand a great deal of abuse, can be cleaned without hazard and are readily interchanged. They are ideal for theaters, department stores and specialty shops where prices or a sales story can be read at a glance. An economical, molding operation for any 6 letters at a time, similar to the process of setting type, has been worked out, and $4^1/_2$-in. high alphabets will soon be in production. It was important that the letters be molded without showing an injection print. Sixteen ounces of material are ejected at one shot by a special air pressure device containing 2 large air cylinders that push the letters out. A mold of the complete alphabet was built including numerals. Each letter or figure is like a piston and as the cylinder moves through the mold, the letters are pushed out pneumatically under a 6875 lb. pressure. Designer: John J. Sture. Materials: Crystalite, Röhm & Haas Co., Inc.; Lucite, E. I. du Pont de Nemours & Co., Inc. Molder: Tech-Art Plastics Company

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HONORABLE

12. *To Rolstad Manufacturing Co.*

for supplying barbers with clean, good-looking sanitary mixers for lather. Resistant to soap, water and heat, qualities not found in previously used metals, the Barsope, de luxe lather mixer, is housed in sleek black phenolic, that will not chip or wear off like enamel finishes, and will retain its "brand new" look even after years of constant handling. Designed for manufacturing economy, the dies were made so that every possible machine operation on the molded parts was eliminated. The motor compartment walls of the main frame serve as the motor housing. These walls, as well as the openings for the shaft bearings and motor brush holders are so accurately molded that they require no machining to give perfect motor alignment and operation. The plastic material is also safer than the metal since there is no danger of an electric short which might shock the operator. Material: Durez, Durez Plastics & Chemicals, Inc. Molder: Central Machine Works Company

13

13. *To Whiting Corp.*

for their completely plastic nameplate that is snappy in assembly and aspect. Used as a trademark, the nameplate is fastened to a stoker with projecting lugs that are on the back of the molded piece. The modern spring tension assembly devices, light in weight and rapidly applied, eliminate threaded inserts, reduce mold costs and cold flow tendencies. Red and green stems are molded with depressions so that letters lock on these upright recesses. Rich and lustrous in appearance, the sturdy cellulose acetate plastic is ideal for a trademark, an insignia that always keynotes the character of the company it represents and must, therefore, always present a bright and shining face. Material: Tenite, Tennessee Eastman Corp. Molder: Gits Molding Corp., Equipment: Hydraulic Press Mfg. Co., Injection Press. Engraving: Daniels-Kummer Co. Speed nuts, Tinnerman Products, Incorporated

14

14. *To Wilcolator Co.*

for designing a combination oven selector switch and thermostat, with other valuable features, complete in one unit and destined for "home on the range." Paralleling the usual design for a unit of this type, this model automatically cuts off the top heater and causes it to remain off after the oven is preheated, thereby relieving the busy housewife of the necessity of watching this operation. For normal baking operations the top heater element is turned off. Back of the styrene bull's-eye are neon lamps that indicate when the oven is up to temperature and whether it is ready for baking, broiling or preheating. The white translucent urea dial is neat in appearance and allows for individual indirect lighting of the complete dial when desired by the appliance manufacturer. Molded furfural-phenolic parts are used for heat-

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resistance and strength. Materials: Bakelite polystyrene, Bakelite Corp; Plaskon, Plaskon Corp; Durite, Durite Plastics Inc. Molder: Consolidated Molded Products Corp. Equipment: Newark Die Co.; Carpenter Steel Company

15. *To Northam Warren Corp.*

for a dainty, compact, flat-carrying case for Cutex accessories. Molded of blue, fade-proof urea compound, the case provides an enduring and attractive easily packed container for complete manicuring essentials. Since the material retains its deep luster, it will not be stained or impaired in any way through contact with the ingredients of nail polish, cuticle oils or polish solvent. Rough handling will not mar the original sparkle and fresh appearance. A spring hinge keeps the lid firmly closed. An integral part of the box are the molded-in wells, grooves, ledges and compartments designed to hold firmly in place the various bottles, emery boards, nail white pencil and other equipment needed for a good manicure. There is no danger of contents sliding around inside while the box is being transported, and the partitions are permanent—will not drop out or deteriorate. Designer: William Longyear. Material: Plaskon, Plaskon Co., Inc. Molder: Norton Laboratories, Incorporated

15

16

16. *To Charles of the Ritz*

for the smart powder blending stand used for counter display of the ingredients employed in blending powder for individual needs of fair ladies. Fabricated of thick clear acrylic sheets cut to size and welded together by heat, the series of square jars allow visibility of contents and can be cleaned with a damp cloth. Formerly made of glass with a metal or wood base, the new plastic unit lessens breakage hazard and facilitates handling and shipping. Overall dimensions are 17 in. by 33 1/2 in. wide. Designer: Malcolm Steiner. Material: Plexiglas, Röhm and Haas Co., Inc. Fabricator: Cyrille Steiner Studios

17. *To Saks Fifth Avenue*

for individualized, transparent molded acrylic exclusive containers designed for their own Celares cosmetics. Massive looking but lightweight, this smart array of cosmetic packages including a powder box, rouge box, lipstick cover, mascara box and lipstick brush, have a brilliance and clarity that distinguish the exclusive line. Filled as sold, these fragile-looking containers are a perfect accompaniment for the cosmetics. Designer: Thomas Platt. Material: Crystalite, Röhm and Haas Co., Inc. Molder: The Thomas Mason Co., Inc. Equipment: Newark Die Co., Reed-Prentice Corporation

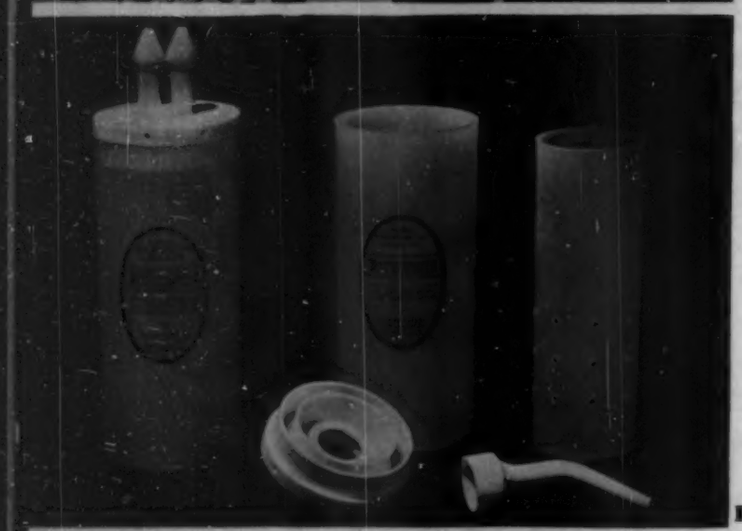
17

18

HONORABLE

18. *To Byard F. Brogan*

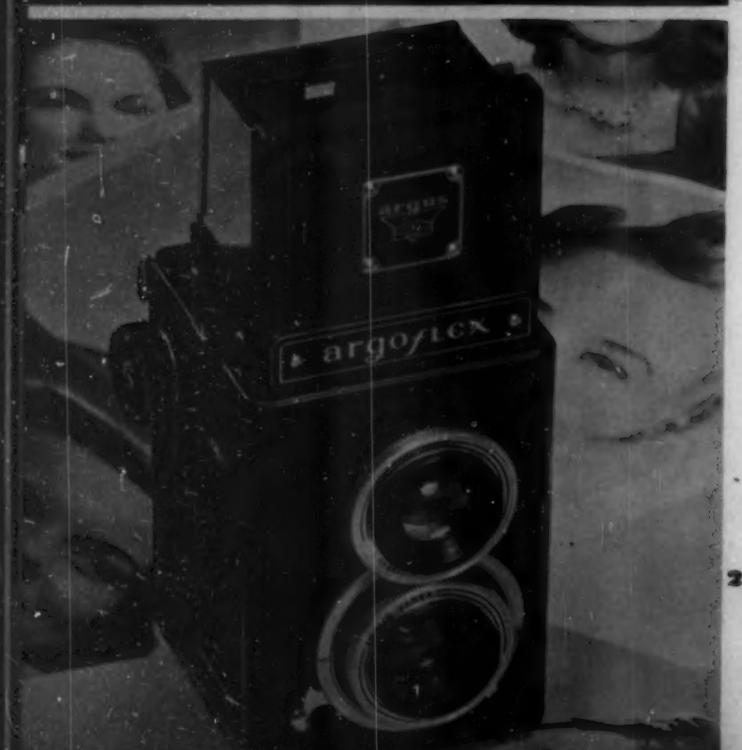
for his well-designed and beautifully executed place card holders that can hold their own beside the finest crystal, and even outsparkle it! Each holder is machined from flat acrylic sheets. Solid silver initials are then cut out and hot pressed into the plastic, after which the complete unit receives a thorough polishing. The flat surface sets off the silver initials and the rough edges catch and reflect light. The simplicity of the design makes the holders appropriate for all kinds of formal table settings with rare china and precious silver. The gleam and sparkle will not become dim with age or use. The modern hostess uses place cards, and those who are particular about details seem to like these crystal-clear plastic models. Material: Plexiglas, Röhm and Haas Co., Inc. Fabricator: Byard F. Brogan



19

19. *To Diathermizer Corp.*

for their therapeutic aid used to spread soothing vapors throughout the respiratory tract (Modern Plastics, September 1940, page 54.) Molded of chemical-resistant polystyrene, the unit consists of five lightweight, non-fragile parts: an outer and inner cylinder and three parts that form the cap and the nasal projection. Use is simple: the container is partly filled with hot water and a few drops of medication are added. The perforated cylinder is inserted so that the holes are below the liquid level and the closure put in place. The user then inhales through either the oral tube or the nasal piece, causing the water to bubble as the air is drawn through. This bubbling, plus the heat, vaporizes the medication and sends it into the far reaches of the irritated passages. The efficacy of the diathermizer is improved by the heat-retentive properties of the material since it keeps the water hot for a longer period. Material: Polystyrene, Monsanto Chemical Co. Molder: Allied Plastic Corp. Equipment: Watson-Stillman Company



20

20. *To International Research Corp.*

for a twin-lens, economically priced reflex camera that is catching the eye of camera fiends from coast to coast. Molded of a phenolic in a stippled leather effect, the housing has a rich, uniform permanent finish that will not scratch or peel off. There is no problem of misfits in gluing leather to the surface. The use of a plastic has enabled the manufacturer to lessen the overall weight of the unit, as well as effect an appreciable reduction in price. The case and back are so accurately molded that no machining is necessary to assure a fine, tight fit. Inserts are used for film winding mechanism bearings and special lugs and mounting posts are molded right into the case, thus avoiding a complexity of assembly and multiplicity of parts. The camera is compact and easy to carry. Material: Durez, Durez Plastics & Chemicals, Inc. Molder: Chicago Molded Products Corporation

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21. ***To Burton Manufacturing Co.***

for their phenolic housed spotlight that is lightweight, heat-resistant, and compact. It is used to provide high intensity illumination for medical examinations, minor operations, microscope work and as a photographic "kick-light." Some idea of the efficiency of the unit can be gained from the fact that the light output is over 3000 footcandles at 12 in. from the source, with an illumination of over 350 footcandles at 36 in. No special bulb is needed for this lamp which has a lighting head that is only $4^1/_2$ in. high. The spotlight is ideal for cavity illumination and for general examination work with or without a head-mirror. Size of bulb is controlled by the adjustable projector type focusing mount. A rim molded onto the metal tube, used to hold the lens and filters, also serves as a nameplate. Designer: Barnes & Reinecke. Material: Bakelite phenolic, Bakelite Corp. Molder: Chicago Molded Products Corporation

21

22. ***To Dayton Insulating Molding Co.***

for reviving the game of shuffleboard with molded phenolic disks and cues that are resistant to the onslaughts of the elements. Exposed to sun, rain or snow, these hardy disks will not warp, split or crack. They defy the effects of salt water, changing climates on cruise ships. All-through, permanent color and the abrasion-resistant surface insure an attractive appearance even after rough wear. Plastics give added life and performance to the disks in play. Lightweight, they seem to travel more evenly without flutter. The density of the material gives the piece additional momentum so that when one disk strikes another, the action is similar to that of billiard balls. Solid black and contrasting colored disks are 6 in. in diameter, $^3/_4$ in. high. Materials: Bakelite, Bakelite Corp; Durez, Durez Plastics & Chemicals, Inc. Designer and Molder: Dayton Insulation Molding Co. Equipment: Miami Dickerson Steel Company

22

23. ***To John T. Riddell, Inc.***

for their economical injection molded two-piece plastic football helmet that will be seen in action on the gridirons this fall. Developed to fill a need for a lighter, stronger, better-ventilated helmet, the headgear is claimed to be more comfortable, possess a better appearance and afford more protection. Molded in halves, the pieces are seamed together with a flat area on top. This method of construction is considerably cheaper than the former process of building the unit from several pieces of fiber and leather. Sweatbands and web tops are suspended within, causing the helmet to spring back from any force against it. The material is used in transparent form and decorated on the inside. Material: Tenite, Tennessee Eastman Corp. Designers: John T. Riddell, Sr., and John T. Riddell, Jr. Molder: Sinko Tool & Mfg. Co. Equipment: Injection molding machine, Hydraulic Press Manufacturing Company

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HONORABLE

24. *To Chicago Musical Instrument Co.*

for gay inexpensive molded toy bugles that actually work. Numbered among the many toy musical instruments formerly imported from countries now at war, these new injection-molded bugles of cellulose acetate have a fine tonal quality and are remarkable for their ease of operation. Designed primarily for drum and bugle corps of children, the colorful bugles are smooth to the lips, practically unbreakable and sanitary. There is no danger of "bleeding paint" or chipped edges. Various types and sizes are manufactured and these range in price accordingly. Designer and Fabricator: Elmer E. Mills Corp. Material: Tenite, Tennessee Eastman Corp. Equipment: Injection molding machine, Reed-Prentice Corp.; Jas H. Matthews Co.; Peerless Mold & Machine Company

25. *To House of Glass*

Spun glass cord coated with a cellulose acetate plastic and intricately woven and crocheted into unusual designs and patterns is now being used for shoes, belts and bracelets. Known as Cotacord, the material is tops in its wearing qualities for the plastic coating, besides lending color and luster, makes the cord tough, strong and water-resistant. Sleek and sparkling, the effect of the material is scintillating and almost jewel-like in appearance. Ensembles, in perfectly matched or contrasting colors, are possible with this interwoven plastic coated cord since an unlimited variety of tints and shades is available. The fact that shoes and accessories made of this cord can be cleaned with a damp cloth is a big selling point. Highly versatile, the textile cord is headed for furniture, mats and sporting goods as well. Designer: House of Glass. Material: Cellulose acetate, Monsanto Chemical Co. Fabricators: Freydberg Bros., Incorporated

26. *To S. H. Thomson Mfg. Co.*

for the Mobilite, a handy portable searchlight that throws a powerful beam over a quarter of a mile. A low-priced injection molded cellulose acetate housing made in halves permits easy assembly of the hook, wiring, socket, focus screw, focus spring and switch before the halves are cemented together. Part of the plastic case is a strong stem which is necessary in order to provide a suitable means for mounting the light. Tests prove that this method is sufficiently strong for any type of mounting used. The complete unit weighs less than a pound and is not affected by temperature variations. Supplied in two-tone color combinations as well as black, the lamp has threads molded right into the plastic housing to permit the use of a conventional lens to hold the reflector. This eliminates the usual door molding. Material: Lumarith, Celluloid Corp. Designer: The S. H. Thomson Mfg. Co. Molder: Watertown Mfg. Co. Equipment: National Tool and Die Co.; Reed-Prentice Corp. Steel: Carpenter Steel Company

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27. *To the Aeronautical Corp. of America*

for the first attempt to dress up small airplane instrument panels. The panel consists of five parts: the formed aluminum-sub-panel on which the instruments are mounted, a center polystyrene plastic panel which serves as a finished cover frame for the instruments, a plastic control panel which is located directly below the center panel on which are mounted the various controls and switches. On each side of these panels are smaller plastic panels. The right-hand one serves as a door for the glove compartment and the left-hand panel serves to carry out the symmetry of the design. Provisions are also made for a radio receiver in the left-hand panel and for a radio transmitter in the right-hand side in place of the glove compartment. By this method, the radio receiver and transmitter are made readily available to both occupants of the plane and the installation of the radio equipment is made more attractive. The large plastic pieces, all injection molded, are a rich cream color and will withstand temperature extremes. Material: Monsanto polystyrene, Monsanto Chemical Co. Molders: The Metal Specialty Co.; Thermo-Plastics Div. of Standard Products Co. Equipment: Engineering Specialties Co.; Speed nuts, Tinnerman Products, Incorporated

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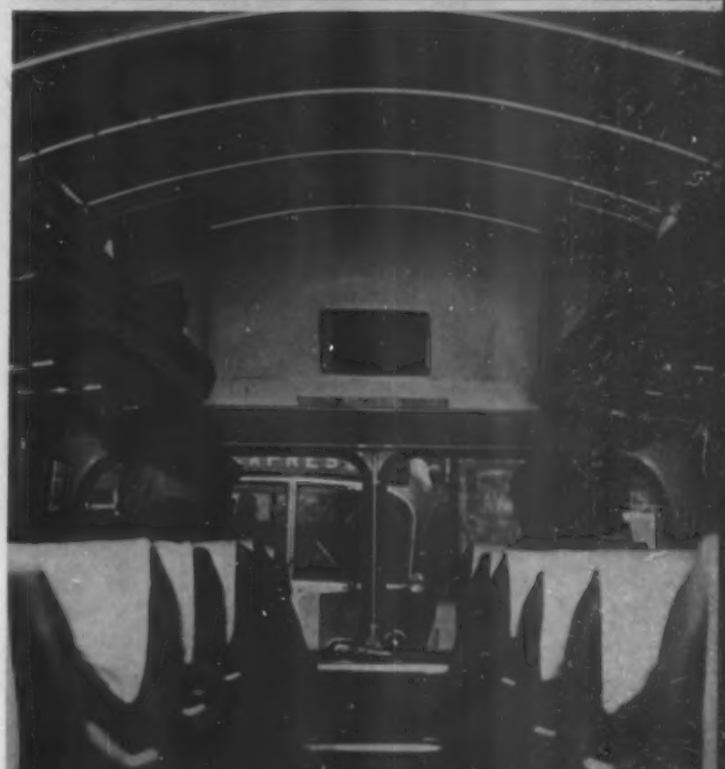
28. *To Technical Ply-Woods*

for the development of Fybr-Tech, a lightweight, strong panel material made by combining vulcanized fiber and veneer with a phenolic resin glue. This was used for the combination luggage rack and air-conditioning conduit on 400 new Greyhound coaches. The material consists of two sheets of the fiber .015 in. thick glued to a sheet of veneer in hot plate presses under heat and pressure, the total thickness being $^{3}/_{32}$ in. Sheets for the rack are first made up in exact size. The flat panels are then put through the various fabricating processes, such as stamping the lamp hole, punching the thousands of $^{1}/_{8}$-in. holes for air conditioning, and drilling the larger holes with a multiple drill machine ready for immediate assembly. The bending operation comes next, and the upper panel has three bends, each of a 1-in. radius. The lower panel has two bends, one of a 1-in. radius and the other $1^{3}/_{8}$ inches. Both panels are connected by an aluminum excrusion which forms a light trough throwing the light to the ceiling. A lamp located at the stamped cut-out provides direct seat lighting. As a final operation panels are water-proofed and then finished with paint. The bottom face of the upper panel and the upper face of the lower panel combine to make a conduit which is used in connection with air conditioning the coaches. The resin bond provides 100 percent adhesion against the moisture which may be present in these conduits. The material is ideal for this particular application because of its light weight, great strength and the ease with which it can be fabricated. Material: Fybr-Tech, Technical Plywoods; Tego resin glue, Resinous Products Co.; Phenolite, National Vulcanized Fibre Co.; American Plywood Corp. Bending Machine, Handy Mfg. Company



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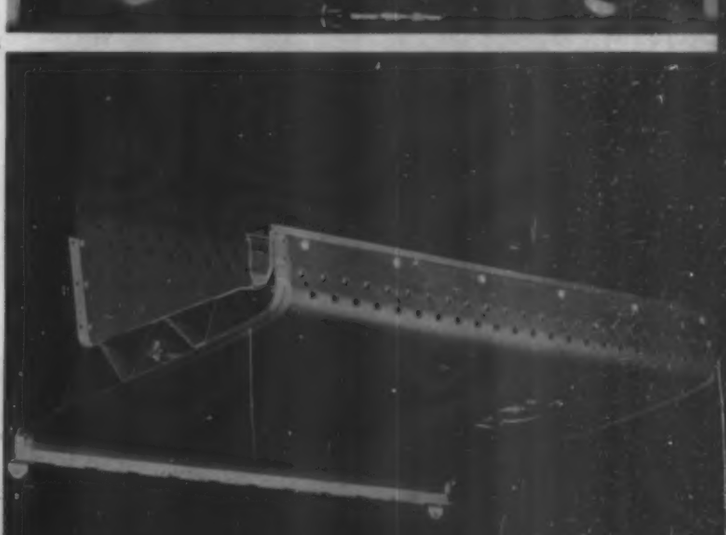

Paulgene chooses

The Pro-Care Manicuring Set is molded for the Paulgene Appliance Corporation, New York City, by the Plastics Department of the General Electric Company. The main unit is a one-piece Plaskon molding measuring 17 inches in length, 9¼ inches in width, and 3¾ inches in height.

Trade Mark Registered

PLASKON

★ MOLDED COLOR ★

PLASKON

for "Pro-care"

"Come in and buy!" is the irresistible invitation which Molded Plaskon in any color or form sends out to passersby!

The Paulgene Pro-Care Manicure Set is a good example of this Plaskon feature. Its rich, warm ivory color; its attractive design that bespeaks artistic handling of manicure services by the operator; its clean, gleaming, inviting surface; its novelty and modernity . . . all these are factors that sell Pro-Care to the trade, and stimulate the demand for manicuring services from the public!

Plaskon Molded Color has become the world's largest-selling urea-formaldehyde plastic because it offers manufacturers so many production and sales advantages.

Do you want color? Plaskon hues are strikingly beautiful, and cover a wide range of warm, glowing tones. Do you want light weight? Plaskon has it, combined with exceptional strength that resists heavy wear. No matter under what conditions Plaskon must serve, it will not chip, corrode, rust or tarnish. And its smooth, hard, non-porous surface cannot be stained or scratched. Plaskon tone values are permanent, because it is solid color through and through.

There are numerous other technical advantages that may be of definite benefit to your product. Plaskon may be adaptable to your present molding schedule, or can be adapted with slight change. We shall be glad to give you the benefit of our technical experience . . . a letter or wire will bring a Plaskon representative to your plant.

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2121 SYLVAN AVENUE • TOLEDO, OHIO
Canadian Agent: Canadian Industries, Ltd., Montreal, P.Q.

Photo at left shows the highly professional type of manicure service made possible with the Paulgene Pro-Care Set.

★

Photo at right shows the dissembled Pro-Care Set, illustrating the various types of molding requirements met by Plaskon on this job.

A Letter from London

RECENT restrictions placed by the Board of Trade on the supplies of certain non-essential manufactured goods to retailers for home consumption will not seriously affect the British plastics industry, as those firms not at present engaged on Government work are busy organizing an energetic export drive. This will, it is hoped, find a profitable outlet for fancy goods, cutlery, domestic appliances and hardware, etc., all of which now embody a good deal of plastics. The subjugation of France and the disappearance of that country's goods from the world's markets is likely to improve matters for British exporters and already a large number of inquiries are being received for various types of fancy goods, particularly dress accessories, from agents in the Near East and some of the Latin American countries.

Of considerable interest is a report that British plastics manufacturers are now keenly interested in the Indian market, as apparently there is great scope for plastic bangles and other ornaments in very bright colors. These were previously made of metal, but now that non-ferrous metals are scarce, merchants are selling similar types of goods fabricated of casein, cast resin and cellulose acetate or molded of urea resin.

Exceptionally long runs of battery torch cases [flashlights] are being molded by several firms in readiness for an unusual demand from the home trade during the coming Winter. The majority of war time battery cases are now molded, as metal is no longer available for this purpose. Attempts to use electroplated plastic reflectors for the torches have not yet been successful.

Measures taken by the Minister of Supply to conserve stocks of tinplate and also non-ferrous metals include a ban on the use of these metals for luxury containers. This means that greater use will be made of molded containers for toilet and beauty preparations, domestic cleaning compounds, etc. It is reported that substantial orders have just been placed with the trade for molded dubbin boot polish cases for the British Army. Leading manufacturers of pharmaceuticals are also reviewing their packaging departments and re-designing a large number of containers formerly made of aluminium, so that plastics may be employed. To save metal and also avoid delay in tooling use is now being made of stock molds, which would, at one time, have been considered rather out-of-date. In war time up-to-the-minute modernity does not really matter and with the pooling of many well-known products there is naturally far less competition. Transparent cellulose films are in great demand for all types of food packing, especially those products, such as chocolates, which, until a few weeks ago, were wrapped in aluminium foil. It is also being used for capping milk bottles.

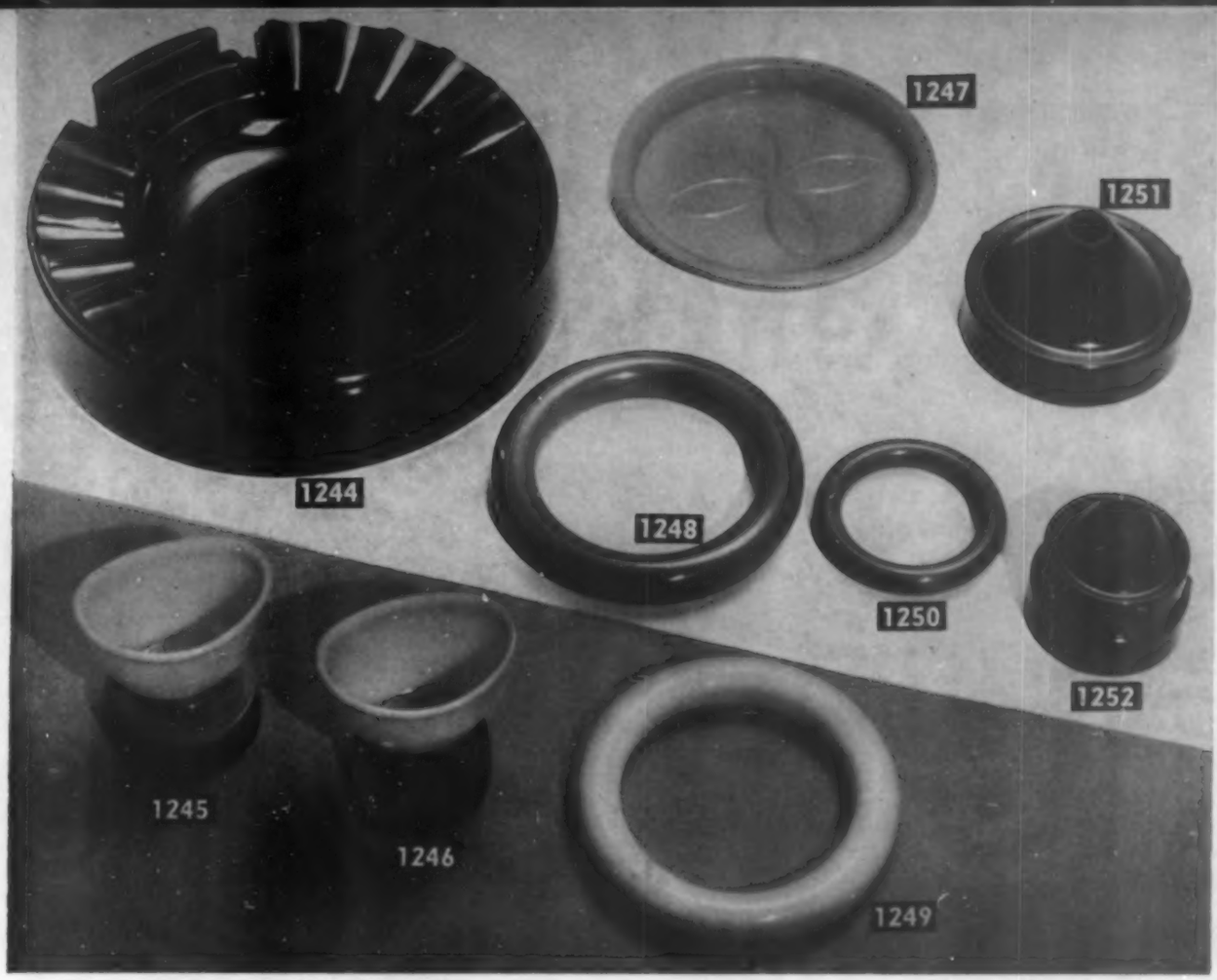
Energetic measures are now being taken to protect all windows and one of the methods now adopted consists of cementing strips of cellulose acetate, about 5/1000 in. thick, on to the inside of the glass. These strips adhere tenaciously to the glass and as the cement, a mixture of acetone and benzene in which a little acetate has been dissolved, is water-resisting, the window may be washed in the ordinary way without fear of removing the anti-percussion strips. This method is an improvement on the accepted practice of sticking thin sheets of cellulose film, 1/1000 in. or less in thickness, on to the window with ordinary spirit gum and does not obscure vision in any way; in fact, the thin strips, measuring only $^1/_2$ in. to 1 in. in width, arranged in lattice form, are hardly visible.

Owing to the demands of the fighting services and the migration of skilled workers into other and more remunerative trades, there has been an increase in the number of women engaged in the plastics industry as press operatives. Firms with experience of women for this work report that, although they are not as satisfactory as men when it comes to intricate work, and they cannot, of course, handle heavy work, they are, on the whole, reliable for automatic jobs. Charge hands agree that, generally speaking, women, once they get used to simple repetition jobs and provided factory conditions are good, are less inclined to change their employers than men.

Agents this side who import machine tools from U.S.A. report that British molders are at present keenly interested in combination machines, such as combination milling machines and jig borers, and American firms making these are doing good business.

The Finance Bill (No. 2), particulars of which were published a short time ago, imposes a tax of $33^1/_3$ percent on the wholesale value of fancy or household goods made wholly or partly of nitrate, phenolic, or other plastic material. It is considered that the operation of this purchase tax will not seriously hamper the activities of British molders as the bulk of the war time orders for this type of goods is for export and moldings for export are not subject to the tax. Undoubtedly the operation of the Bill will cause a certain amount of dislocation, but this may, in the long run, prove beneficial, as it will release skilled workers for more essential jobs and also enable worth-while economies to be effected in the use of tool steels and the services of busy tool makers.

Some idea of the now widespread substitution of plastics for metal in all walks of life will be given when it is stated that Cardinal Hinsley, Archbishop of Westminster, has announced that he proposes to distribute about $2^1/_4$ million crosses to men in the British fighting forces and civil defense workers. (*Please turn to page 160*)



Stock Molds

SHEET ONE HUNDRED

Ash tray, coaster, dispenser caps, eye cup closures and other useful accessories are available without mold cost from stock molds. For manufacturers' names and addresses, write Stock Mold Dept., Modern Plastics, Chanin Building, New York, giving item and sheet numbers

---

1244. Ash tray with 20 molded rests for smokes around top. Overall diameter 5 in. Overall height 1 in. Inside diameter 3 in. Inside depth 5/8 in. Opening for book or box matches

1245. Combination eye cup and bottle cap. Overall height 1 1/2 in. Diameter of cup 1 9/16 in. Lined, threaded cap with fluted rim, 1 1/4 in. overall diameter; 1/2 in. high

1246. Combination eye cup and bottle cap, same as above but cap has 1 1/16 in. overall diameter

1247. Coaster in standard colors. Overall diameter 3 1/16 in. Inside diameter 2 3/4 in. 1/16 in. high

1248. Utility ring, 7/16 in. overall height. Overall diameter 2 5/8 in. Inside diameter 1 7/8 inches

1249. Utility ring, 3/8 in. overall height. Overall diameter 2 1/2 in. Inside diameter, 1 3/4 inches

1250. Utility ring, 1/4 in. overall height. Overall diameter 1 5/8 in. Inside diameter 1 1/4 inches

1251. Dispenser jar or bottle cap, 48 mm., threaded. Overall diameter 2 in. 1 3/8 in. high. 3/8 in. top opening

1252. Dispenser jar or bottle cap, 3-step, 28 mm. threaded. Overall diameter, 1 5/16 in. 1 3/8 in. high. 5/16 in. top opening

All molders are invited to send samples from stock molds to appear on this page as space permits

NEWS FROM THE ANNUAL ...THAT IS NOTHING

1940 AWARD PLAQUE of the Annual Modern Plastics Competition. Three products using Durez plastics this year received this plaque, while three others received Honorable Mention in this industry-wide contest.

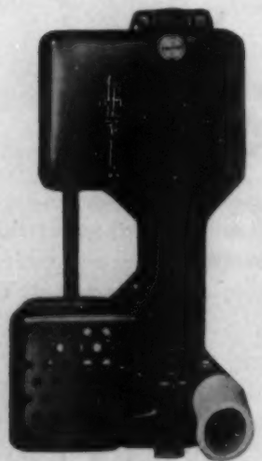
AGAIN THIS YEAR, the superiority of Durez among phenolic plastics is demonstrated in the Annual Modern Plastics Competition. No less than three First Awards, and three Honorable Mentions were chalked up by Durez in this all-inclusive—and conclusive—contest!

It is only natural that Durez should take pride in this record in a contest where hundreds of plastic products were entered. But there is nothing surprising about it. The qualities which have won first places for Durez products in competition have made this versatile material *first choice* of hundreds of manufacturers in many different fields.

Perhaps you are looking for a way to give your product more sales appeal, to increase its usefulness, reduce its weight, improve its appearance or simplify its production. Chances are, Durez can help you do all these things—and more. Our engineers would welcome an opportunity to show you how you, too, might turn out a winner with Durez plastics. For more information and a copy of the interesting new booklet shown below write—

DUREZ PLASTICS & CHEMICALS, INC.
5570 Walck Road, North Tonawanda, N.Y.

HOW DUREZ PLASTICS have helped many manufacturers make better products is told in a new booklet "It's a New Business Custom." It's good reading—and you may find it *valuable* reading.



FIRST AWARD, Transport Group, to Fleming Bilge Pump with molded special Durez plastic housing. Product of the Geo. W. Fleming Co., Plantsville, Conn. Molded by J. W. Oris Manufacturing Co., Thomaston, Conn.

HONORABLE MENTION, Miscellaneous Group, to Barsope De Luxe, sanitary shaving soap dispenser. Product of Rolstad Manufacturing Company, Minneapolis, Minn. Designed by the manufacturer in collaboration with The Central Machine Works Company and molded by the latter.

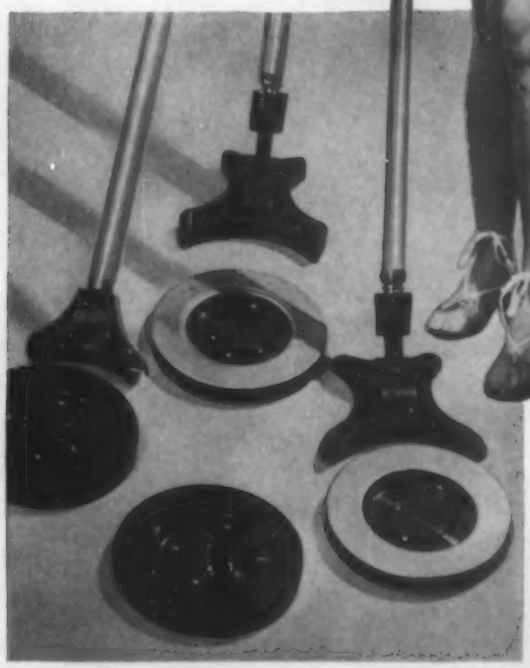
DUREZ PLASTICS & CHEMICALS, INC.
PLASTICS THAT FIT THE JOB

PLASTICS COMPETITION NEW TO DUREZ!

SPECIAL FIRST AWARD (only special award and special group in entire Annual Modern Plastics Competition), to "Resnprest" Durez resin-bonded plywood. Product of the M & M Wood Working Company, Portland, Oregon.

FIRST AWARD, Communications Group, to Kadette "Topper" Radio with molded Durez housing. Product of Kadette Radio Corporation, Ann Arbor, Mich. Designed by Barnes & Reinecke, and molded by Firestone Rubber & Latex Products Co.

HONORABLE MENTION, Scientific Group, to Argoflex Camera. Designed and manufactured by International Research Corporation, Ann Arbor, Mich. Durez plastics housing molded by Chicago Molded Products Company.



HONORABLE MENTION, Sporting Goods, Toys and Games Group, to molded Durez shuffleboard discs. Designed and molded by Dayton Insulating Molding Company, Dayton, Ohio.

DUREZ PLASTICS & CHEMICALS, INC.

PLASTICS THAT FIT THE JOB

WINNERS OF TOP AWARDS AND HONORABLE MENTIONS *SELECT* THE LEADING INJECTION MOLDING MACHINE

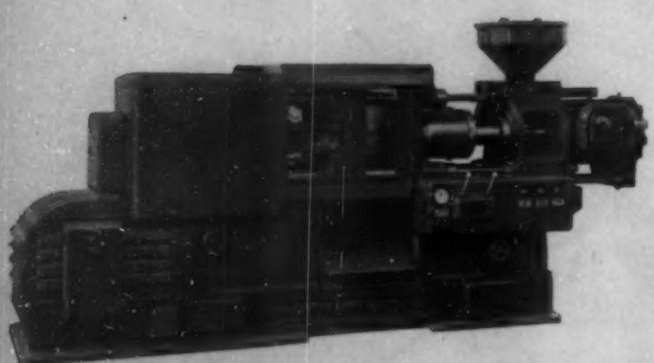
REED-PRENTICE

WATCH OUR ADS IN FUTURE ISSUES— WE'LL SHOW YOU OTHER AWARD WINNERS AND OTHER OUTSTANDING JOBS MOLDED ON REED-PRENTICE MACHINES
TRI-PAK
OIL

Above are shown representative award winners molded on Reed-Prentice Injection Molding Machines.

1. Household Group—W
   Rich and France, Inc.—Broom
   Molder: Elmer E. Mills Corp.
2. Transportation Group—W
   Chrysler Instrument Panel
   Molder: Chrysler Corp.
3. Sporting Goods Group—H.M.
   Chicago Musical Instrument Co.
   —Bugles
   Molder: Elmer E. Mills Corp.
4. Miscellaneous Group—H.M.
   Saks and Co.—Celares Line
   Molder: Thomas Mason Co.
5. Transportation Group—H.M.
   S. H. Thomson Mfg. Co.
   Model 5M Mobilite
   Molder: Watertown Mfg. Co.
6. Miscellaneous Group—W
   Tri-Pak Gun Kit Inc.—Oil Can
   Molder: Remler Co. Ltd.

W—Top Award *H.M.—Honorable Mention*



Available in 2, 4, 6, 8 ounce capacities
Reed-Prentice features covered by Patents Pending

Congratulations to all—designers, molders, manufacturers—who contributed so generously to the success of the 1940 Modern Plastics Competition. The recognition accorded the winning concerns is a well-earned tribute, and definitely spells PROGRESS in the plastics industry.

This year, as in previous years, Reed-Prentice equipment played a vital part in the molding of a large share of the winning entries. While the list of these winners is ample evidence of Reed-Prentice's leadership, still more impressive is the list of profit-winners, produced on our machines the year 'round.

Why not investigate at once the Reed-Prentice features which will assure you consistent profit-winners?

REED-PRENTICE CORPORATION

WORCESTER, MASS., *Main Office and Works*

OVER 300 MACHINES IN SUCCESSFUL OPERATION

Sorption of water by plastics*

by G. M. KLINE, A. R. MARTIN, and W. A. CROUSE**

THERE have been numerous reports in the literature during the past three years concerning the sorption of water by various types of plastics and their resulting dimensional changes. The general opinion is that the mechanical and electrical properties and dimensional stability of plastics are definitely affected by water absorbed by them and that low water absorption is of considerable advantage in a plastic material. Another point that is usually stressed is that provided a material has been selected on the basis of mechanical and electrical properties, measurement of water absorption constitutes a simple method of testing to ensure that the desired grade or quality of material is being obtained.

A tentative method of test entitled "Water Absorption of Plastics" has been prepared by Subcommittee V of Committee D-20 on Plastics working in cooperation with Subcommittees II and III of Committee D-9 on Electrical Insulating Materials. This method replaces the short-time water absorption tests provided for in A.S.T.M. Standards D48-39 for molded insulating materials, D229–39 for sheet and plate materials, D349-39 for laminated round rods, and D348-39 for laminated tubes.

Part of the experimental data obtained in an exploratory investigation at the National Bureau of Standards of the absorption of water by plastics in connection with the preparation of this test method is summarized in this paper.

* Based on a paper presented at the Annual Meeting of the American Society for Testing Materials in Atlantic City, N. J., June 28, 1940.
** National Bureau of Standards.

Materials and test methods

The plastics examined were phenol-formaldehyde molded, cast, and paper-base laminated materials, urea-formaldehyde molded and paper-base laminated

TABLE I.—EFFECT OF TIME OF CONDITIONING AND DURATION OF IMMERSION ON ABSORPTION OF WATER BY PLASTICS

Material	Thickness, mils	24 Hours immersion after				48 Hours immersion after			
		24 Hr. at 50° C., %	48 Hr. at 50° C., %	2 Days at 25° C., 50% R. H., %	24 Hr. at 105–110° C., %	24 Hr. at 50° C., %	48 Hr. at 50° C., %	2 Days at 25° C., 50% R. H., %	24 Hr. at 105–110° C., %
Phenol-formaldehyde molded	128	0.34	0.32	0.26	..	0.50	0.47	0.40	...
Phenol-formaldehyde cast	127	0.26	0.25	0.16	0.16	0.37	0.37	0.24	0.22
Phenol-formaldehyde laminated	134	0.49	0.48	0.44	0.39	0.84	0.86	0.82	0.71
Urea-formaldehyde molded	125	0.73	1.02	0.48	..	1.15	1.37	0.76	...
Urea-formaldehyde laminated	132	0.67	0.72	0.38	0.98	0.97	1.04	0.62	1.11
Vinyl chloride-acetate resin	133	0.05	0.05	0.03	0.08	0.07	0.07	0.05	0.11
Vinyl butyral resin	122	1.05	1.01	0.75	..	1.48	1.47	1.12	...
Methyl methacrylate resin	139	0.35	0.33	0.22	0.37	0.46	0.46	0.31	0.53
Styrene resin (molded)	126	0.05	0.05	0.03	..	0.05	0.05	0.03	...
Styrene resin (cast)	156	0.05	0.05	0.03	..	0.06	0.06	0 03	...
Cellulose nitrate	123	0.99	1.00	0.64	..	1.38	1.40	0.91	...
Cellulose acetate	133	2.52	2.61	2.00	2.80	3.54	3.70	2.88	4.00
Ethylcellulose No. 1	185	0.85	0.86	0.57	0.65	1.18	1.20	0.83	1.45
Ethylcellulose No. 2	166	1.07	1.05	0.84	1.24	1.47	1.47	1.16	1.71
Cold-molded phenolic	128	1.03	1.06	0.69	..	1.27	1.23	0.90	...
Cold-molded bituminous	130	0.61	0.58	0.49	..	0.82	0.86	0.84	...
Casein	121	8.46	8.40	8.10	9.95	13.41	12.91	13.49	14.65

TABLE II.—VOLATILE MATTER LOST BY PLASTICS UNDER VARIOUS CONDITIONS

Material	24 hr. at 50° C. mg.	24 hr. at 50° C. %	48 hr. at 50° C. mg.	48 hr. at 50° C. %	1 hr. at 105–110° C. mg.	1 hr. at 105–110° C. %	24 hr. at 105–110° C. mg.	24 hr. at 105–110° C. %
Phenol-formaldehyde molded	11	0.12	14	0.14	...	..	...	..
Phenol-formaldehyde cast	27	0.33	39	0.48	70	0.85	294	3.58
Phenol-formaldehyde laminated	17	0.20	27	0.31	28	0.32	121	1.40
Urea-formaldehyde molded	60	0.63	104	1.10	...	..	...	..
Urea-formaldehyde laminated	40	0.43	67	0.69	39	0.41	369	3.91
Vinyl chloride-acetate resin	3	0.03	4	0.04	7	0.08	28	0.32
Vinyl butyral resin	39	0.59	52	0.79	...	..	...	..
Methyl methacrylate resin	19	0.23	23	0.28	28	0.35	58	0.71
Styrene resin (molded)	2	0.03	2	0.03	...	..	...	..
Styrene resin (cast)	2	0.03	2	0.03	7	0.09	15	0.19
Cellulose nitrate	69	0.84	77	0.93	67	0.82	430	5.23
Cellulose acetate	80	0.95	103	1.22	97	1.04	282	3.33
Ethylcellulose No. 1	36	0.36	46	0.45	41	0.41	66	0.65
Ethylcellulose No. 2	46	0.50	48	0.52	55	0.60	85	0.94
Cold-molded phenolic	33	0.24	35	0.26	...	..	...	..
Cold-molded bituminous	16	0.13	24	0.19	...	..	...	..
Casein	105	1.36	142	1.84	129	1.71	511	6.77

materials, casein, cellulose nitrate, cellulose acetate, ethylcellulose, polyvinyl chloride-acetate, polyvinyl butyral, polystyrene in molded and cast forms, polymethyl methacrylate, and cold molded plastics of the bituminous and phenolic types. These plastics were obtained from commercial sources and many of them contained the plasticizers ordinarily present in such compositions. Specimens 1 by 3 in. by the thickness of the samples, which was approximately $^1/_8$ in., were cut from the sheet materials. The molded specimens were disks 2 in. in diameter and $^1/_8$ in. thick. The surface areas on these two forms of specimens are approximately equal.

The conditioned specimens were placed on edge and wholly immersed in distilled water, which had been freshly boiled and then cooled and maintained at 25 deg. C. Bubbles usually collect on the test specimens when immersed in water which has not been freshly boiled and this causes irregular exposure of the surface to the water. At the desired intervals, the specimens were wiped off with a dry cloth to remove surface water, and weighed immediately. Changes in dimensions were measured with dial gages reading to 0.001 in. and having approximately 400 g. per sq. cm. pressure on the foot. All percentage changes in weights and dimensions are calculated on the basis of the as-received weights and dimensions of the specimens, unless otherwise noted.

Investigation of conditioning procedures

The data in Table I pertain both to the effect of various conditioning procedures on the value obtained for water absorption and to the values observed for 24- and 48-hour immersion. It will be noted that for the specimens of approximately $^1/_8$-in. thickness conditioned at 50 deg C., the water absorption value is practically the same for a 24-hour conditioning period as for the 48-hour period. The value obtained when the

TABLE III.—EFFECT OF EXPOSURE OF SAMPLES TO WET OR DRY ATMOSPHERES PRIOR TO MAKING WATER ABSORPTION TEST

	Exposure conditions							Water absorption values, %[1]					
Experiment number	72 Hr. at 100 percent relative humidity	72 Hr. at 50° C.	72 Hr. at room temp.	48 Hr. at room temp.	24 Hr. at 50° C.	48 Hr. in H_2O	24 Hr. at 50° C.	Methyl methacrylate resin	Cellulose acetate	Ethyl-cellulose No. 2	Vinyl butyral resin	Laminated phenolic resin	Laminated urea resin
1	x	..	..	x	x	x	x	0.50	4.33	1.69	1.55	1.13	1.07
2	x	..	..	..	x	x	x	0.49	4.22	1.53	1.52	..	..
3	..	x	..	x	x	x	x	0.52	4.15	1.62	1.58	0.94	0.87
4	..	x	..	..	x	x	x	0.53	3.96	1.57	1.49	..	..
5	..	..	x	x	x	x	x	0.52	4.16	1.60	1.55	0.91	1.07
6	..	..	x	..	x	x	x	0.50	3.94	1.57	1.55	..	..

[1] Based on weight of specimen immediately prior to immersion in water.

sample is conditioned at 25 deg C. and 50 percent relative humidity is lower than that obtained after heating for 24 or 48 hours at 50 deg. C. without humidity control. This is attributable to the elimination of moisture by heating at 50 deg. C. and the greater rate of regain of this moisture as compared with the subsequent rate of absorption of water. On the other hand, conditioning the samples at 105 to 110 deg. C. for 24 hours leads to somewhat erratic results as compared with those observed after heating at 50 deg. C. For some materials, notably the phenolic resin products, the water absorption value is lowered, whereas in most instances a considerably higher value is obtained. Some materials, particularly cellulose nitrate, vinyl butyral resin, and styrene resin, deteriorate or soften to such an extent when heated for 24 hours at 105 to 110 deg. C. that the specimens become unsuitable for the water absorption test.

The losses in weight of the specimens for the various conditioning procedures are shown in Table II. Heating at 105 to 110 deg. C. for 1 hour results in losses similar to those produced by exposure at 50 deg. C. for 24 or 48 hours, except for three materials, namely: cast phenolic resin, styrene resin, and vinyl chloride-acetate resin. For these materials the loss in weight is 2 to 3.5 times as great at 105 to 110 deg. C. for 1 hour as at 50 deg. C. for 24 to 48 hours. Heating at 105 to 110 deg. C. for 24 hours results in relatively large losses in weight by many of the plastics.

The data in Table III show the effect on water absorption by plastics of an exposure to a wet or dry atmosphere immediately prior to starting the test. The effect of a two-day interval of exposure at room temperature and humidity after such wetting or drying and before starting the moisture absorption test was also investigated, as a possible means of overcoming the consequences of an abnormal past history. The experimental data, not reported in Table III, revealed that 24 hours heating at 50 deg. C. was sufficient to remove the water taken up by the samples when exposed in a saturated atmosphere for 3 days. Also, the total amount of water driven off on allowing the samples, which had been exposed in a saturated atmosphere for 3 days, to stand in the air two days followed by 24 hours heating at 50 deg. C. was approximately the same as that removed by heating the samples for 24

TABLE IV.—EFFECT OF IMMEDIATE IMMERSION OF SPECIMEN ON WATER ABSORPTION VALUE

Material	Water absorption by method: A, %	B, %	C, %
Methyl methacrylate resin	0.46	0.37	0.62
Laminated phenolic resin	0.87	0.79	1.13
Laminated urea resin	1.06	0.38	1.06
Ethylcellulose No. 2	1.48	1.17	1.72
Vinyl butyral resin	1.61	1.14	1.98
Cellulose acetate	4.24	2.74	4.92
Casein	13.15	12.36	14.15

Method A: Exposed for 48 hr. at 50° C. prior to immersion for 48 hr. in water at 25° C. and conditioned for 48 hr. at 50° C. after immersion.

$$\% \text{ absorption} = \frac{\text{wet wt.} - \text{conditioned wt.}}{\text{conditioned wt.}} \times 100$$

Method B: Immersed immediately and conditioned for 48 hr. at 50° C. after immersion.

$$\% \text{ absorption} = \frac{\text{wet wt.} - \text{original wt.}}{\text{conditioned wt.}} \times 100$$

Method C.: Immersed immediately and conditioned for 48 hr. at 50° C. after immersion.

$$\% \text{ absorption} = \frac{\text{wet wt.} - \text{conditioned wt.}}{\text{conditioned wt.}} \times 100$$

TABLE V.—COMPARISON OF VARIOUS METHODS OF REPORTING WATER ABSORPTION

All specimens were conditioned at 50 deg. C. for 48 hours and immersed in water at 25 deg. C. for 48 hours

	Material	Thickness, mils	Specific gravity	Water absorption based on: Weight of water absorbed, mg.	Conditioned weight of specimen, %	Surface area of specimen, g./sq. m.	Volume of specimen, g./cu. dm.
1.	Styrene resin molded	126	1.03	3.5	0.05	0.8	0.6
2.	Styrene resin cast	156	1.03	4.8	0.06	1.0	0.6
3.	Vinyl chloride-acetate resin	133	1.35	6.4	0.07	1.4	1.0
4.	Phenol-formaldehyde resin cast	127	1.29	30.3	0.37	6.7	4.9
5.	Methyl methacrylate resin	139	1.16	37.2	0.46	8.1	5.4
6.	Phenol-formaldehyde resin molded	128	1.40	43.2	0.47	9.4	6.9
7.	Phenol-formaldehyde resin laminated	134	1.33	75.9	0.87	16.6	11.6
8.	Vinyl butyral resin	122	1.09	96.8	1.48	21.5	16.1
9.	Urea-formaldehyde resin laminated	132	1.46	99.8	1.06	22.1	15.4
10.	Cold-molded bituminous	130	1.87	111.2	0.87	24.3	17.4
11.	Ethylcellulose No. 1	185	1.10	121.3	1.20	25.2	13.4
12.	Cellulose nitrate	123	1.36	114.9	1.40	25.5	19.0
13.	Urea-formaldehyde resin molded	125	1.47	130.1	1.39	28.5	21.2
14.	Ethylcellulose No. 2	166	1.12	136.2	1.48	28.8	16.7
15.	Cold-molded phenolic	128	2.09	169.3	1.24	37.0	26.9
16.	Cellulose acetate	133	1.28	313.0	3.75	68.6	47.9
17.	Casein	121	1.25	997.0	13.15	221.8	167.6

TABLE VI.—MOISTURE ABSORPTION DURING EIGHT WEEKS' IMMERSION IN WATER AFTER VARIOUS CONDITIONING PROCEDURES

Material	Gain in 48 hr. at 25° C., 50% R. H., %	Loss in 24 hr. at 50° C., %	Loss in 48 hr. at 50° C., %	Gain in 48 hr. at 50° C., 90% R. H., %	Loss in 48 hr. at 50° C., %	Gain during immersion in water, % 24 hr.	48 hr.	7 days	8 weeks	Net gain in weight, %
Phenol-formaldehyde molded	0.02	..	..	..	..	0.25	0.40	0.91	4.69	4.71
Phenol-formaldehyde molded	..	0.12	..	..	..	0.34	0.50	1.07	4.99	4.87
Phenol-formaldehyde molded	..	..	0.16	..	..	0.32	0.49	1.04	4.82	4.66
Phenol-formaldehyde molded	..	..	..	0.45	0.44	0.38	0.51	0.96	4.40	4.41
Phenol-formaldehyde cast	−0.02	..	..	..	..	0.16	0.25	0.54	1.87	1.85
Phenol-formaldehyde cast	..	0.32	..	..	..	0.24	0.37	0.74	2.16	1.84
Phenol-formaldehyde cast	..	..	0.43	..	..	0.25	0.36	0.78	2.34	1.91
Phenol-formaldehyde cast	..	..	..	0.66	0.82	0.31	0.47	0.86	2.07	1.91
Phenol-formaldehyde laminated	0.06	..	..	..	..	0.44	0.84	2.24	6.38	6.42
Phenol-formaldehyde laminated	..	0.19	..	..	..	0.49	0.83	...	...	...
Phenol-formaldehyde laminated	..	..	0.31	..	..	0.48	0.86	2.26	6.48	6.17
Phenol-formaldehyde laminated	..	..	..	0.29	0.55	0.55	0.93	2.35	6.42	6.16
Urea-formaldehyde molded	0.10	..	..	..	..	0.49	0.79	1.98	5.02	5.12
Urea-formaldehyde molded	..	0.59	..	..	..	0.75	1.07	2.20	5.45	4.86
Urea-formaldehyde molded	..	..	1.15	..	..	1.12	1.50	3.21	6.88	5.73
Urea-formaldehyde molded	..	..	..	1.32	1.90	1.20	1.71	2.95	4.66	4.08
Urea-formaldehyde laminated	0.07	..	..	..	..	0.40	0.65	1.44	3.50	3.57
Urea-formaldehyde laminated	..	0.44	..	..	..	0.70	1.01	1.93	4.35	3.91
Urea-formaldehyde laminated	..	..	0.75	..	..	0.77	1.07	1.96	4.40	3.65
Urea-formaldehyde laminated	..	..	..	1.54	2.02	1.30	1.73	2.64	3.82	3.34
Vinyl chloride-acetate resin	0.01	..	..	..	..	0.04	0.05	0.08	0.13	0.14
Vinyl chloride-acetate resin	..	0.03	..	..	..	0.05	0.06	0.11	0.16	0.13
Vinyl chloride-acetate resin	..	..	0.05	..	..	0.05	0.07	0.12	0.17	0.12
Vinyl chloride-acetate resin	..	..	..	0.09	0.11	0.05	0.06	0.10	0.14	0.12
Vinyl butyral resin	0.04	..	..	..	..	0.75	1.12	2.24	5.83	5.87
Vinyl butyral resin	..	0.60	..	..	..	1.07	1.52	2.80	6.54	5.94
Vinyl butyral resin	..	..	0.82	..	..	1.02	1.54	2.87	6.77	5.95
Vinyl butyral resin	..	..	..	1.59	2.06	0.99	1.39	2.55	6.08	5.61
Methyl methacrylate resin	0.05	..	..	..	..	0.21	0.31	0.60	1.17	1.22
Methyl methacrylate resin	..	0.23	..	..	..	0.33	0.45	0.80	1.43	1.20
Methyl methacrylate resin	..	..	0.29	..	..	0.32	0.45	0.83	1.48	1.19
Methyl methacrylate resin	..	..	..	0.45	0.64	0.33	0.46	0.83	1.39	1.20
Styrene resin molded	0.01	..	..	..	..	0.03	0.03	0.03	0.03	0.04
Styrene resin molded	..	0.03	..	..	..	0.05	0.05	0.05	0.05	0.02
Styrene resin molded	..	..	0.04	..	..	0.05	0.05	0.05	0.05	0.01
Styrene resin molded	..	..	..	0.04	0.06	0.04	0.04	0.04	0.05	0.03
Styrene resin cast	0.00	..	..	..	..	0.03	0.03	0.04	0.04	0.04
Styrene resin cast	..	0.03	..	..	..	0.05	0.06	0.06	0.06	0.03
Styrene resin cast	..	..	0.02	..	..	0.05	0.06	0.06	0.06	0.04
Styrene resin cast	..	..	..	0.04	0.06	0.04	0.06	0.06	0.06	0.04
Cellulose nitrate	−0.10	..	..	..	..	0.64	0.91	1.43	1.27	1.3[a]
Cellulose nitrate	..	0.83	..	..	..	0.98	1.37	2.07	1.97	1.2[a]
Cellulose nitrate	..	..	0.92	..	..	0.97	1.38	2.12	2.04	1.2[a]
Cellulose nitrate	..	..	..	0.77	1.61	0.94	1.32	1.97	1.83	1.1[a]
Cellulose acetate	0.17	..	..	..	..	2.02	2.90	4.16	3.09	4.3[a]
Cellulose acetate	..	0.93	..	..	..	2.52	3.56	...	...	...
Cellulose acetate	..	..	1.22	..	..	2.61	3.70	5.23	4.45	4.0[a]
Cellulose acetate	..	..	..	2.00	3.17	2.48	3.43	4.83	4.02	3.7[a]
Ethylcellulose No. 1	0.11	..	..	..	..	0.59	0.86	1.50	2.57	2.68
Ethylcellulose No. 1	..	0.32	..	..	..	0.83	1.16	1.90	3.03	2.71
Ethylcellulose No. 1	..	..	0.46	..	..	0.85	1.18	1.91	3.02	2.56
Ethylcellulose No. 1	..	..	..	1.23	1.50	0.81	1.13	1.87	2.79	2.52
Ethylcellulose No. 2	0.02	..	..	..	..	0.82	1.15	1.99	3.19	3.21
Ethylcellulose No. 2	..	0.50	..	..	..	1.08	1.50	2.42	3.62	3.12
Ethylcellulose No. 2	..	..	0.51	..	..	1.05	1.50	2.44	3.63	3.12
Ethylcellulose No. 2	..	..	..	1.27	1.76	1.05	1.45	2.36	3.47	2.98
Cold-molded phenolic	0.00	..	..	..	..	0.61	0.84	1.21	2.06	2.06
Cold-molded phenolic	..	0.23	..	..	..	0.86	1.08	1.66	2.88	2.65
Cold-molded phenolic	..	..	0.25	..	..	0.98	1.30	1.81	3.06	2.81
Cold-molded phenolic	..	..	..	0.29	0.53	1.10	1.27	1.82	2.86	2.62
Cold-molded bituminous	0.06	..	..	..	..	0.54	0.84	1.83	4.64	4.70
Cold-molded bituminous	..	0.15	..	..	..	0.59	0.88	1.80	4.68	4.53
Cold-molded bituminous	..	..	0.20	..	..	0.63	0.93	1.80	4.74	4.54
Cold-molded bituminous	..	..	..	0.63	0.61	0.71	1.01	1.95	4.77	4.79
Casein	0.13	..	..	..	..	8.68	14.25	28.18	35.08	35.21
Casein	..	1.39	..	..	..	7.50	11.94	29.17	37.31	35.92
Casein	..	..	1.89	..	..	8.28	12.82	30.06	37.26	35.37
Casein	..	..	..	4.65	5.58	9.52	14.32	29.70	36.08	35.15

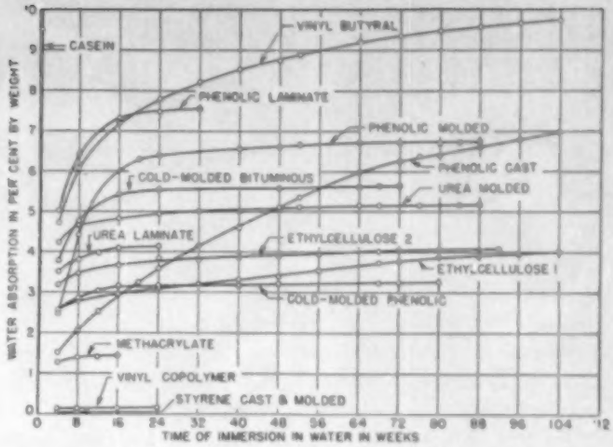
[a] Solution of water-soluble constituents has masked the actual increase in weight of the sample attributable to the absorption of water.

hours at 50 deg. C. immediately following the 3 days' exposure to 100-percent relative humidity. The values presented in Table III for water absorption after these various treatments show very good agreement in most instances. It is believed to be quite conclusive evidence that a 24-hour conditioning period at 50 deg. C. is sufficient for samples 1/8 inch thick preparatory to making water absorption tests.

The effect of eliminating the preliminary conditioning at 50 deg. C. and using the conditioned weight obtained after immersion as a basis for calculating the percentage moisture absorption is shown in Table IV. It will be noted that if the difference between the weight of the sample after immersion and its original weight is taken as the amount of water absorbed, the values (column B) for percentage absorption are lower than those obtained by prior conditioning (column A) because under condition B the moisture content of the samples as received retards the absorption of further quantities of water. On the other hand, if the difference between the weight of the sample after immersion and its weight after subsequent conditioning at 50 deg. C. for 48 hours is taken as the amount of water absorbed, the values (column C) are higher than those obtained by the usual method (A) because under condition C a portion of the initial moisture content of the material is removed by the conditioning at 50 deg. C. along with the water absorbed during immersion.

Comparison of various methods of reporting water absorption

The plastics investigated are arranged in Table V in the order of increasing values for water absorption per unit surface area when conditioned at 50 deg. C. for 48 hours and immersed in water for 48 hours. Other values given in the table are the weight of water taken up by the specimens, the percentage absorption based on the as-received weight of the specimens, and the absorption per unit volume of the original specimen. If the water absorption per unit of surface area is assumed to line the materials up in the proper order, then the cold-molded and vinyl butyral specimens appear to be out of place in the column giving the percentage changes in weight. This can be accounted for by the high specific gravity of the cold-molded specimens and the low specific gravity of the vinyl butyral resin. The ethylcellulose materials are out of place in the column showing the amount of water absorbed per unit volume because these specimens were considerably thicker than those of the other materials and hence give lower values when the results are calculated per unit volume. The only significant displacement noted in values obtained for 24 hours conditioning and 24 hours immersion in water, but not shown in Table V, was in the position of the urea-formaldehyde molded material. The urea-formaldehyde molded and laminated samples were found to be quite erratic in their behavior in these tests, but in general the position of the molded material will be immediately following the laminated material.



1—*Absorption of water by plastics. Data for this chart are presented in Table VI on opposite page*

Absorption of water over long periods

Data on the absorption of water by plastics during long continued immersion are presented in Table VI and Fig. 1. Four specimens of each plastic were submitted to different conditioning procedures and were then placed in water. It will be observed that the prior conditioning does affect appreciably the amount of moisture absorbed by the plastic. However, when the gains or losses in the various conditioning treatments are taken into consideration, there is very good agreement between the net amounts of moisture absorbed by the four specimens of each plastic, as shown in the last column of Table VI. Again it will be noted that the urea-formaldehyde plastics show the least uniform behavior in these tests.

The specimens of cellulose nitrate and cellulose acetate show a decrease in weight between the 7-day and 8-week periods. This is caused by the dissolution of water-soluble constituents of the plastic which masks the actual increase in water content. This dissolving action is, of course, actually taking place from the instant of immersion of the specimen and is overbalanced during the early stages by the water-absorptive capacity of the plastic. In order to avoid obtaining a false figure for the amount of water absorbed by plastics containing water-soluble ingredients, a requirement has been inserted in the A.S.T.M. tentative method for reconditioning the specimen after the period of immersion. In the tests reported in Table I, in which the specimens were heated at 50 deg. C. for 48 hours and immersed in water for 48 hours at 25 deg. C. reconditioning at 50 deg. C. for 48 hours revealed that four materials had lost some soluble matter, namely: phenol-formaldehyde cast resin 0.10 percent, cellulose nitrate 0.14 percent, cellulose acetate 0.49 percent, and vinyl butyral resin 0.15 percent. These figures should, therefore, be added to the 48-hour values in Table I to obtain a corrected figure for weight increase because of water absorption. The loss of soluble matter during the 24-hour immersion period specified in the A.S.T.M. tentative method (*Please turn to page 152*)

Plastics versus corrosion

by CHARLES G. MUNGER*

SOME four years ago there was developed a protective coating which is a combination of the most inert of the new thermoplastic resins, and combines the resistance of the molded products into a cold-applied, sprayed coating. It dries by the evaporation of its solvents and requires no heat for curing or long drying period for oxidizing into the final film. When the solvents have evaporated, an inert film is produced which has the same properties as those thermoplastic resins which were originally dissolved.

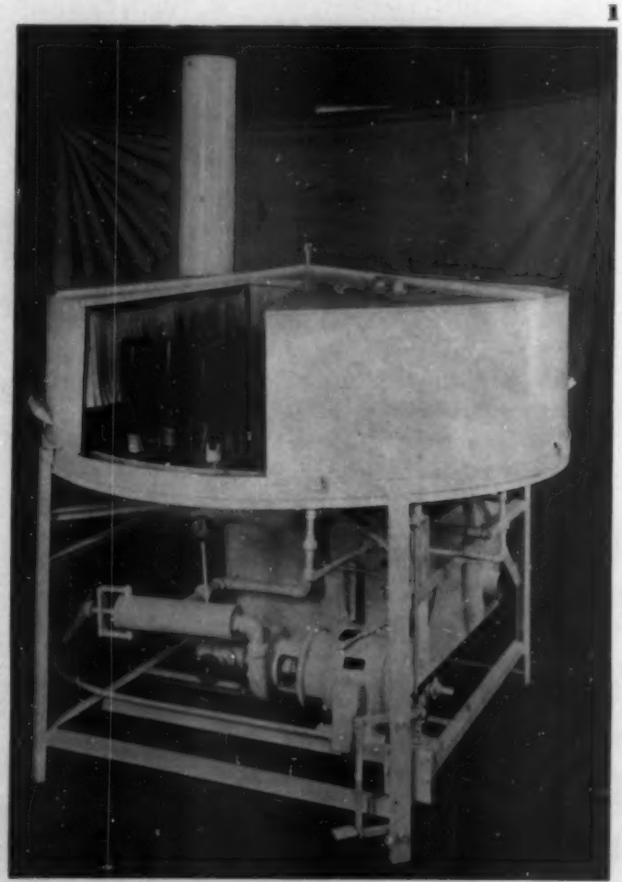
As a coating, it is built up in three layers, each of which has specific properties which, with ample care in their application, go to make up the finished coating. The first, the prime coat, has the essential property of adhering tenaciously to the surface to which it is applied and also adhering to and combining with the following coats. It is combined with pigments which make it anti-corrosive. The second is an inert resin solution which has dispersed in it air-blown silica. This coat, when the solvents have evaporated, makes a thorough bond to the first coat and leaves a film of an appreciable thickness and body. The third is a layer of pure resin which acts as an inert seal over the other two coats. This penetrates the first two coats, increasing the resin concentration and bonding them more tightly together. The finished coating is approximately $^1/_{50}$ of an inch thick, has either a grey or black glossy surface, is always thermoplastic, thus easily following the expansion and contraction of the material to which it is applied, and except for very low temperatures, is permanently slightly plastic although the surface has a high resistance to abrasion.

Properties

When thoroughly dry, this coating is odorless, tasteless, non-contaminating, abrasion-resistant, and is resistant to cold mineral acids, including hydrochloric, sulfuric, phosphoric, nitric, etc., even in concentrated solutions. Alkalies such as sodium hydroxide, potassium hydroxide, etc., have no effect upon this coating in any concentration, even at temperatures as high as 150 deg. F. Sodium and calcium hypochlorite and other caustic cleaning and sterilizing agents being in the same category, also have little or no effect. Oils, fats, waxes, aliphatic hydrocarbons such as gasolines, etc., all mineral salts, oxidizing agents, and acids such as tannic, have no effect upon the coating. The lower fatty acids have some effect upon these resins in that the concentrated acid tends to soften the film. The lower concentrations, however, have less effect, and the minute concentrations found in wine and other foods have no effect according to the reports.

The resins are entirely insoluble in all aliphatic alcohols, including methyl, ethyl, propyl, butyl alcohols, etc., and are equally insoluble in the polyalcohols such as glycol and glycerol. The alcohols not only do not have any solvent action on these resins, but have a definite antisolvent action. By this is meant that if alcohol is present, even in small quantities, in the true solvents for the resins, it materially retards or prevents solution. The solvents for these resins are the esters, ketones, chlorinated hydrocarbons, and aromatic hydrocarbons. These solvents, however, rarely cause the corrosion of iron or steel, and would not be ordinarily encountered in severe corrosive conditions.

1—*Coated inside and out with Amercoat, plastic base paint, this bottle-washing machine withstands the effects of a wash water containing 3 percent sodium hydroxide and many times 3 percent sodium hypochlorite*



* Chemist, American Concrete and Steel Pipe Co.

The resins used in this coating have been selected in the laboratory by tests with a large number of thermoplastic resins as a coating over sandblasted steel bars. The test bars covered with the resins were made as nearly identical as possible, the same concentration of resin being used and the same time and method of drying. These were then placed in 30 percent sulfuric acid, 3 percent sulfuric, 10 percent caustic soda, ethyl alcohol, gasoline, 10 percent solution of common salt, tap water, 5 percent acetic acid, 10 percent nitric acid, 10 percent hydrochloric acid, commercial hydrochloric acid, and 10 percent phosphoric acid, at room temperature. This test was conducted over a period of 4 months at which time the resins were selected that showed the best results in all cases with the exception of acetic acid, by which all resins were badly attacked.

Application

The care in preparation of the surface before the application of the coating is of prime importance. Sand or shot blasting is always recommended in that this is the sure way to remove all of the mill scale, rust or previous coating. This is necessary because any rust or foreign material left on the surface is a focal point for the breakdown of any impervious film. As soon as the blasting has been completed, the prime solution is applied. This is easily brushed over the clean surface. When the solvents are out of this coat, the body or enamel coat is applied by means of spray equipment. A spray coat of this material is built up to an appreciable thickness. This coat requires overnight to dry. The last coats are then applied—two coats of the clear resin in solution. These produce an impervious seal over the whole area. Air must then be circulated through a tank or any enclosed container until all of the volatile solvents are removed. Hot air may be used to hasten this evaporation.

Uses

The wine industry has been a very large user of this coating. The protection of wine and brandy against steel and concrete has long been a serious problem. Iron and calcium are absorbed into wine or brandy from steel and concrete, respectively, and cause cloudiness and metallic taste. The tests which have been made with this coating in wines and brandy extended over a period of a year, and showed no aroma, taste, or chemical change in the wine or brandy and no visible deterioration in the coating.

In the past year some 150 wine tank cars have been lined with this coating. These cars carry all types of wine to distribution points all over the United States and Canada. Several large wineries in Central California have lined their steel brandy storage and weighing tanks and there are many smaller wine installations. This coating has also been satisfactorily used as a concrete floor coating where new juice and oxidized wine seriously attack the concrete.

2

3

2—Used to transport food products, fruit juices and corrosive chemicals, 55-gallon drums are lined with Amercoat to prevent contamination. 3—Huge iron tank cars for carrying wine are similarly lined

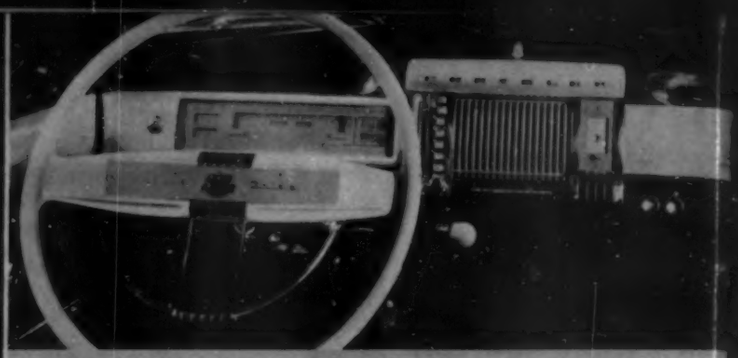
Other fruit juices offer similar problems of corrosion and protection, the orange by-products industries having made extensive tests. Tests have been made by them on this product over a period of the last year in orange, lemon, and grapefruit juices, orange and lemon oil, citric acid, pectin, and other citrus by-products. These tests have all been satisfactory. Other juices tested included pineapple, loganberry, grape, tomato, etc., all with the same success.

Extensive tests have been carried on, and several applications subsequently made by the alkali industry. Tests have been made in caustic (NaOH) from a 1 percent concentration to a 50 percent concentration, with temperatures ranging from cold to 150 deg. F. Many of these tests have extended over a year period and show 100 percent protection both to the caustic and the steel. Sodium hypochlorite tanks have also been successfully lined, protecting the bleach from deterioration and the steel from disintegration.

On the acid side, tests have been made for several years on this coating with the various mineral acids in all concentrations. The tests have shown that the material will withstand these acids in the laboratory and the industrial applications (*Please turn to page 158*)

Sales Register Housing

Molded by Sinko Tool & Mfg. Co. for United Autographic Register Co.



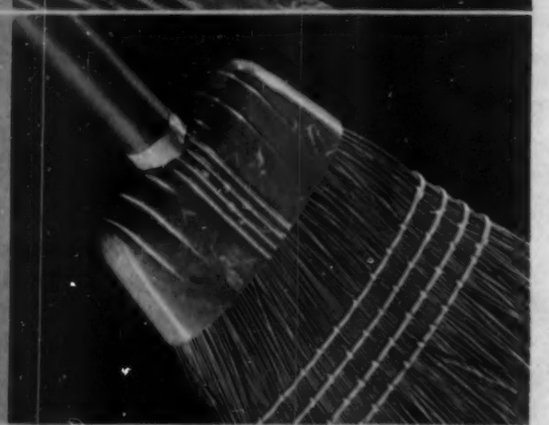
Automobile Instrument Panel *Molded by Chrysler Corp. for 1941 "New Yorker" Model*

Portable Radio Casing

Molded by Therma-Plastics, Inc. for Philco Radio & Television Corp.

Broom Shoulders

Molded by Elmer E. Mills Corp. for Rich & France Co.



TENITE in the Fifth Plastics

JUDGES select Tenite as the outstanding material in this year's plastics developments. These 14 winners are typical of the variety of products now being molded of Tenite.

Exceptional strength, beauty and durability, combined with excellent molding properties, make Tenite one of the most versatile plastics on the market. It is available in an unlimited range of colors, including transparent, translucent, opaque, and variegated effects.

A 28-page illustrated book on the uses of Tenite will be sent on request. Technical literature on its molding and physical properties is also available.

Nameplates

Molded by Gits Molding Corp. for The Whiting Corp.

Chessmen *Molded by Ability Mold & Die Works for Gallant Knight, Inc.*

Arch Supports

Sheet Stock Molded by Insulation Mfg. Co., Inc. for Brooklyn Arch Support & Foot Appliance Laboratory

Woven Furniture *Strips extruded by Detroit Macoid Corp. for Ypsilanti Reed Furniture Co.*

WINNERS

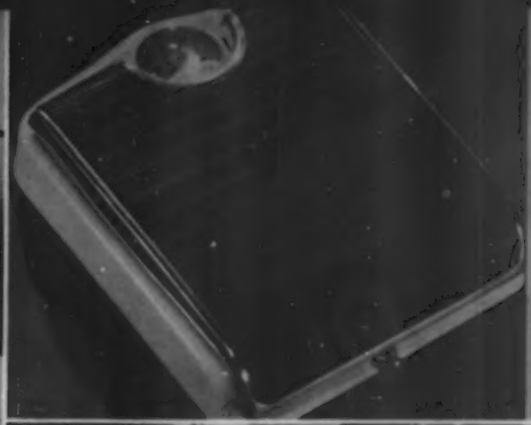
Annual Modern Competition

TENITE REPRESENTATIVES: *New York*, 10 East 40th St. *Buffalo*, 1508 Rand Building. *Chicago*, 2264 Builders' Building. *Detroit*, 904-5 Stephenson Building. *Leominster, Mass.*, 39 Main St. . . . Pacific Coast: Wilson & George Meyer & Company—*San Francisco*, Federal Reserve Building; *Los Angeles*, 2461 Hunter St.; *Seattle*, 1020 4th Ave., South.

* * *

TENNESSEE EASTMAN CORPORATION
KINGSPORT, TENN.

Subsidiary of the Eastman Kodak Co.



Bathroom Scales Housing

Molded by National Lock Co. for The Brearley Co.

Greeting Cards

Molded by Belmont Molded Plastics, Inc. for Gibson Art Co.

Oil Containers

Molded by Remler Co., Ltd. for Tri-Pak Gun Kit, Inc.

Football Helmet

Molded by Sinko Tool & Mfg. Co. for John T. Riddell, Inc.

Bugles

Molded by Elmer E. Mills Corp. for Chicago Musical Instrument Co.

Shower Nozzles *Molded by Thermo-Plastics, Inc. for Mueller Brass Co.*

A.S.T.M. test for water absorption

THE complete text of the method for measuring the absorption of water by plastics, developed by the Subcommittee on Permanence Properties of A. S. T. M. Committee D-20 on Plastics in cooperation with Committee D-9 on Electrical Insulating Materials, is presented herewith by permission of the American Society for Testing materials. This method was adopted as a Tentative Standard of the Society at the Annual Meeting held in Atlantic City, N. J., June 1940.

Scope

1. This method of test covers the procedure for determining the relative rate of absorption of water by plastics when immersed. The method is intended to apply to the testing of all types of plastics, including cast, hot-molded, and cold-molded resinous products, and both homogeneous and laminated plastics in rod and tube form, and in sheets 0.005 in. or greater in thickness.

NOTE 1.—The moisture content of a plastic is very intimately related to such properties as electrical insulation resistance, dielectric losses, mechanical strength, appearance, and dimensions. The effect upon these properties of change in moisture content due to water absorption depends largely on the type of exposure (by immersion in water or by exposure to high humidity), shape of the part, and inherent properties of the plastic. With non-homogeneous materials, such as laminated forms, the rate of water absorption may be widely different through each edge and surface. Even for otherwise homogeneous materials, it may be slightly greater through cut edges than through molded surfaces. Consequently, attempts to correlate water absorption with surface area must generally be limited to closely related materials and to similarly shaped specimens. For materials of widely varying density, relation between water absorption values on a volume as well as a weight basis may need to be considered.

NOTE 2.—The test for rate of water absorption has two chief functions: first, as a guide to the proportion of water absorbed by a material and consequently, in those cases where the relationships between moisture and electrical or mechanical properties, dimensions, or appearance have been determined, as a guide to the effects of exposure to water or humid conditions on such properties; and second, as a control test on the uniformity of a product. This second function is applicable to sheet, rod, and tube forms when the test is made on the finished product.

Apparatus

2. The apparatus shall consist of the following:

(*a*) *Balance.*—An accurate chemical balance.

(*b*) *Oven.*—An oven capable of maintaining uniform temperatures of 50 ± 3 deg. C. (122 ± 5.4 deg. F.) and of 105 to 110 deg. C. (221 to 230 deg. F.).

Specimens

3. (*a*) The test specimen for molded plastics shall be in the form of a disk 2 in. (5.08 cm.) in diameter and $^1/_8$ in. (0.32 cm.) in thickness. Permissible variations in thickness are plus or minus 0.007 in. for hot-molded and plus or minus 0.012 in. for cold-molded or cast materials.

(*b*) The test specimen for sheets shall be in the form of a bar 3 in. (7.62 cm.) in length by 1 in. (2.54 cm.) in width by the thickness of the material. When comparison of absorption values with molded plastics is desired, specimens $^1/_8$ in. in thickness should be used. Permissible variations in thickness of the $^1/_8$ in. thick specimen shall be plus or minus 0.008 in. except for asbestos-fabric-base phenolic laminated materials or other materials which have greater standard commercial tolerances.

(*c*) The test specimen for rods shall be 1 in. in length for rods 1 in. in diameter or under, and $^1/_2$ in. in length for larger diameter rods. The diameter of the specimen shall be the diameter of the finished rod.

(*d*) The test specimen for tubes less than 3 in. in inside diameter shall be the full section of the tube and 1 in. in length. For tubes 3 in. or more in inside diameter, a rectangular specimen shall be cut 3 in. in length in the circumferential direction of the tube and 1 in. in width lengthwise of the tube.

(*e*) The test specimens for sheets, rods, and tubes shall be machined, sawed, or sheared from the sample so as to have smooth edges free from cracks. The cut edges shall be made smooth by finishing with No. 0 or finer sandpaper or emery cloth. Sawing, machining, and sandpapering operations shall be slow enough so that the material is not heated appreciably (Note).

NOTE.—If there is any oil on the surface of the specimen when received or as a result of machining operations, wash the specimen with a cloth wet with gasoline to remove oil, wipe with a dry cloth, and allow to stand in air for 2 hours to permit evaporation of the gasoline. If gasoline attacks the plastic, use some suitable solvent or detergent that will evaporate within the 2-hour period.

(*f*) The dimensions listed in the following table for the various specimens shall be measured to the nearest 0.001 in. Dimensions not listed shall be measured within plus or minus $^1/_{32}$ in.

Type of Specimen	Dimensions to Be Measured to the Nearest 0.001 In.
Molded disk	Thickness
Sheet	Thickness
Rod	Length and diameter
Tube	Inside and outside diameter, and wall thickness

Conditioning

4. Three specimens shall be weighed individually and then conditioned as follows:

(*Please turn to page 154*)

Translucent LAMICOID

Colorful letters or designs get a permanent finish by our special "Graphic" process. ▲
Eye-catching sales messages are interchangeable on this scale made by Hobart Mfg. Co. ▼

Brilliant night or day legibility on this scoreboard made by Newbery Electric Corp. ▼

...adds eye-appeal and color to electrical products

HERE is a tip that alert product designers will be quick to utilize . . . a flexible, light-diffusing material with all the surface features of a plastic resin finish. Typical of many modern products which have been improved through the use of Translucent Lamicoid are these four applications shown.

The rear-illuminated traffic sign combines a simple method of production with weatherproof lettering that remains permanently clear and accurate. The scale signs illustrate the use of Translucent Lamicoid and rear-illumination as an ingenious merchandising medium.

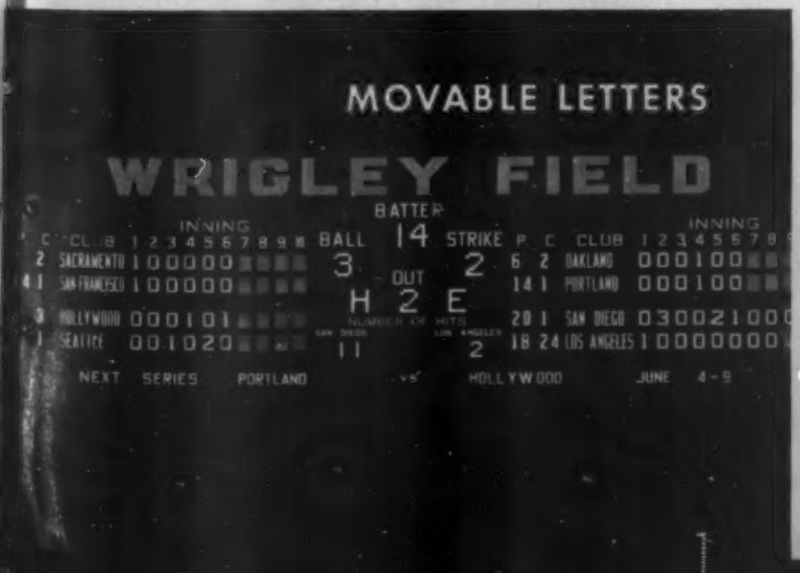
In the case of the mammoth scoreboard, this versatile sheet material made possible movable figures and letters simply by painting dark areas with opaque color. To the lighting fixture, Translucent Lamicoid contributes an economical material adapted to mass production—as well as modern styling, in harmony with the complete design.

You, too, will find Translucent Lamicoid is easy to specify and to use . . . because it is available in ten brilliant colors and white . . . can be readily curved and machined, silk-screen printed, painted or sand blasted.

May we send you samples that will help in suggesting uses of the material to fit your own requirements?

MICA INSULATOR COMPANY

200 Varick St., New York; 542 So. Dearborn St., Chicago; 1276 West 3rd St., Cleveland. *Branches at* Birmingham, Boston, Cincinnati, Los Angeles, San Francisco, Seattle. Canada: Montreal, Toronto.



▼ Heat-resistant trim curved and machined for this fixture made by Lighting Products Co

Plastics at Detroit A.C.S. Meeting

PLASTICS has become a separate subsection under the Division of Paint and Varnish Chemistry of the American Chemical Society which officially changed its name to the Division of Paint, Varnish and Plastics Chemistry at the semi-annual convention of the Society held in Detroit during the week of September 9. The Division will consist of two sections, the Paint and Varnish Section and the Plastics Section. According to the new by-laws adopted by the Division, the Chairman is to be selected alternately from these two sections.

The following officers were elected to serve during the year 1941: Chairman, G. G. Sward, National Paint, Varnish and Lacquer Association; Chairman-Elect, Shailer L. Bass, Dow Chemical Co.; Secretary-Treasurer, A. C. Elm, The New Jersey Zinc Co.; Executive Committee, W. I. Patnode, General Electric Co.; H. F. Payne, American Cyanamid Co.; and E. J. Probeck, Jones-Dabney Co.

Titles, authors and abstracts of the various papers presented before the Plastics Section at the Detroit meeting are as follows.

THE SOLUBILIZING EFFECT OF HYDROGENATION UPON AROMATIC DERIVED RESINS. William H. Carmody.

Continued investigation of indene-coumarone polymers has resulted in the discovery that the entry of hydrogen into the molecule takes place in a well-defined manner, and occurs according to a newly-established concept of zones of receptivity. Three such zones are known. The first zone, in which fulvenation and discoloration take place, can absorb only one mole of hydrogen to reach a saturated condition. The second zone is comprised of carbon atoms residing deep in the molecular structure; entry of hydrogen causes relatively little change in both the resulting chemical and physical properties. The third zone is made up of all the remaining carbon atoms most remote from the cyclopentadiene ring. Entry of hydrogen into this zone causes enormous change in all the properties. The ability of the polymer molecules to associate has been destroyed; the solubility in petroleum materials is greatly improved; and the heat stability is greatly enhanced. Recent introduction of selectively hydrogenated resins has given rise to improved materials, and represents a distinct advance in supplying improved resins to industry. The earlier types of hydrogenated indene resins are being displaced as rapidly as the present processes can be commercialized.

THE POLYHYDRIC ALCOHOL-POLYBASIC ACID REACTION. VI. THE GLYCERYL ADIPATE AND GLYCERYL SEBACATE POLYESTERS. R. H. Kienle and F. E. Petke.

The formation of polyesters from glycerin and adipic acid and sebacic acid, respectively, has been studied quantitatively at 190 deg. C. The changes in acid number, water evolved and saponification value were determined throughout the reaction to gelation. No temperature increase was observed on mixing. Samples of both polyesters just prior to gelation were examined. Spreading area on 0.001 *N* HCl, the infra-red spectra, the ultimate analysis, percentage of esterification and the average molecular weight were determined. From the data, no evidence was obtained of reactions other than interesterification. As was the case in the other polyesters of the (2,3) type thus far studied in this series, gelation occurred when a molecular complexity equivalent to approximately 30 mole percent of tetramer had formed. Contrary to the polyesters prepared from polybasic acids of short chain length, the glyceryl adipate and glyceryl sebacate polyesters appear still to have present at gelation a small but measurable amount of monomer.

MOLECULAR SIZE DISTRIBUTION IN THREE DIMENSIONAL POLYMERS AND THE PHENOMENON OF GELATION. Paul J. Flory.

Inasmuch as the occurrence of gelation is confined to those polymer systems functionally capable of unlimited growth in three dimensions, it has been suggested frequently that gelation is due to the formation of infinitely large molecules. It has been suggested further that the critical point at which gelation occurs should correspond to one intermolecular linkage per structural unit. In opposition to such an interpretation, however, two well-known experimental observations have been cited: (*a*) that the gel point is reached before the number of intermolecular linkages equals the number of units, and (*b*) that at the gel point the average molecular weight is not extremely large. Statistical calculations show that during the polymerization of bifunctional reactants in the presence of small quantities of trifunctional or tetrafunctional reactants, the weight fractions of highly branched species increase gradually at the expense of smaller molecules. This continues until a critical point is reached, whereupon infinite networks appear; thereafter the weight fraction of infinite networks increases at the expense of all species of finite size. If the critical point at which infinite networks appear is identified with the gel point, the theory provides a satisfactory explanation of the following facts: (*a*) that much of the material in the gel is soluble, (*b*) that the average molecular weight at the gel point is not infinite, and (*c*) that gelation occurs before there is one intermolecular linkage per initial monomeric unit. Thus the hypothesis that gelation occurs as a result of the formation of infinitely large three-dimensional molecules is in agreement with experimental observations.

THE REACTIVITY OF PHENOLS TOWARD PARAFORMALDEHYDE. Murray M. Sprung.

The reaction between phenols and paraformaldehyde in the presence of a weak alkaline catalyst has been studied kinetically at temperatures between 68 deg. and 98 deg. C. Under these conditions, the disappearance of formaldehyde apparently follows a first order rate law. The velocity constants at 98 deg. C. decrease in the following order: 3,5-xylenol > *meta*-cresol > 2,3,5-trimethyl phenol > phenol > *para*-cresol > saligenin > *ortho*-cresol > 2,6-dimethyl phenol. The total spread in rates is about fifty-fold. The observed velocity constants are composites of the rates of addition of the first, second and third molecules of formaldehyde. The behavior of saligenin indicates that the second mole of formaldehyde is added at about one-third the rate of the first. A bromination procedure has been used to gain an insight into the condensation processes, or secondary reactions, which involve the conversion of methylol (*Please turn to page 164*)

WINNERS, ALL!

..IN DESIGN, IN UTILITY AND IN SALES!

Top Award, Lighting Group, to Miller Company, Meriden, Connecticut, for its fluorescent lighting fixtures, using embossed sheets of Monsanto Plastics as diffusing panels.

Six awards—six classifications—six different types of Monsanto Plastics! In a nutshell, that sums up the products shown on this page, award winners in the 1940 Modern Plastics Competition. To the winning manufacturers and the fabricators of these products — congratulations! To the manufacturer who has not yet considered the use of plastics, a suggestion:

Since Monsanto Plastics have found application in such varied fields as represented by these prize-winners, the chances are that the versatility and wide range of these colorful and modern materials can add *prize-winning* and *sales making* qualities to *your* product. It's worth investigating, isn't it?

For information on Monsanto Plastics applied to *your* individual need, inquire: MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield, Massachusetts. District Offices: New York, Chicago, Detroit, St. Louis, Birmingham, Los Angeles, San Francisco, Montreal.

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Cellulose Acetate • Cellulose Nitrate • Cast Phenolic Resin
Vinyl Acetal • Polystyrene • Resinox Phenolic Compounds

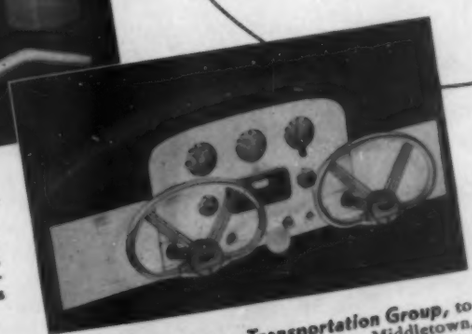
Sheets • Rods • Tubes • Molding Compounds • Castings
Vuepak Rigid Transparent Packaging Materials

Top Award, Architectural Group, to W. L. Stensgaard & Associates, Chicago, for these translucent display plaques, cast from quick-setting liquid phenolic resin.

MONSANTO PLASTICS
SERVING INDUSTRY...WHICH SERVES MANKIND

Honorable Mention, Style and Fashion Group, to House of Glass, N. Y., for accessories of Cotacord, developed by Freyd'berg Bros., Stamford, Conn., using Monsanto Cellulose Plastic as a coating for the cord.

Honorable Mention, Scientific Group, to the Diathermizer Corporation, San Francisco and New York, for its Diathermizer Inhalator, molded of Monsanto Polystyrene by Allied Plastics Corporation, Los Angeles.



Honorable Mention, Transportation Group, to Aeronautical Corporation of America, Middletown, O., for instrument panel of Aeronca airplane. Trim molded of Monsanto Polystyrene by the Metal Specialty Co., Cincinnati, O., and Thermo-Plastics, Inc., St. Clair, Mich.

Honorable Mention, Business and Office Equipment Group, to the W. A. Sheaffer Pen Company for pen sets designed of Monsanto Cast Phenolic Plastic. Blade on letter opener injection molded from Monsanto Cellulose Acetate by Worcester Molded Plastics, Worcester, Mass.

Plastics Digest

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastics materials or use them. Requests for copies of the magazines mentioned should be directed to the individual publishers whose addresses will be mailed upon receipt of a self-addressed stamped envelope.

General

PHOTOMICROGRAPHY WITH OPTICAL PLASTICS. W. D. Owen. British Plastics *12*, 95–6 (Aug. 1940). A lens is defined generally as "a piece of glass bounded, for ease of construction, by two spherical surfaces which may or may not have equal radii." Hence the marketing of lenses made of synthetic resins by a molding process constitutes a revolution in the optical world. The production of aspherical surfaces on glass lenses to overcome spherical aberration is not a practical proposition, but it is claimed that plastic lenses with aspherical surfaces can be readily molded. Illustrations of low-power photomicrographs made with plastic lenses and a schematic diagram of the optical system employed are shown.

THE ELECTRICAL AND GENERAL PHYSICAL PROPERTIES OF PLASTICS. Chemistry and Industry *59*, 537–41 (July 27, 1940). A report of a round-table discussion of the physical and chemical changes taking place on heating plastics and of the interrelationships between the mechanical and electrical properties of plastics and their molecular structure. The difficulty which obstructs a full understanding of the mechanisms underlying the electrical and mechanical behavior of amorphous solids is our lack of knowledge of the forces restricting the relative motion of the constituent molecules and, in particular, of a polar group relative to its parent, or to an adjacent, molecule. Polystyrene, polyethylene, phenol-formaldehyde resin and mica have approximately equal intrinsic electric strengths at −196 deg. C., which suggests a comparison with one investigator's contention that all materials have approximately the same elastic modulus but have varying relaxation times.

Materials and Manufacture

METAL PLATED PLASTICS. J. B. Kushner. Product Eng. *11*, 364–6 (Aug. 1940). Plating on plastics can be effectively employed in design to obtain light weight with the appearance of metal, decorative effects, surface hardness for plastic surfaces subject to wear, reduced moisture absorption, heat resistance, and electrostatic shielding.

RAW MATERIALS FOR NYLON. British Plastics *12*, 80 (Aug. 1940). The chief components of nylon resins are said to be sebacic, adipic, and methyl adipic acids, on the one hand, and hexamethylene diamine and decamethylene diamine, on the other. Hydrogenation of phenol yields cyclohexanol which can be oxidized to adipic acid. Similarly, cresol yields methyl cyclohexanol and then methyl adipic acid. Castor oil when treated with caustic soda yields sebacic acid. Hexamethylene diamine is made by passing ammonia and adipic acid over a dehydration catalyst at a high temperature to yield adiponitrile which is then subjected to high-pressure catalytic hydrogenation. Similarly, decamethylene diamine is produced by way of sebacic acid and sebaconitrile. An alternative route to hexamethylene diamine is through heptaldehyde, also derived from castor oil, to epsilon-caprolactam and thence by hydrogenation to the diamine.

NEW TRANSPARENT PLASTICS. A. D. Sokolov and N. S. Zarubina. Org. Chem. Ind. (USSR) *7*, 228–31 (1940). Phenolic resins of the Resolit P type can be used for making transparent molded articles. Increasing fluidity in the molding composition decreases mechanical strength. Good mechanical properties are obtained by molding about three minutes per millimeter of thickness. The best mechanical properties are obtained in moldings made from powders with lowest moisture content. Approximately ten percent of hexamethylenetetramine should be used in the resolit composition for the best mechanical properties. (Translation available from Hooker Scientific Library, Central College, Fayette, Mo.)

Molding and Fabricating

SELECTION OF DOWELS AND GUIDE PINS FOR PLASTIC MOLDS. British Plastics *12*, 57–61 (July 1940). The merits of various types of dowels and pins are considered, and the importance of these parts to the life of the mold, the ease of the molding operation, and the accuracy of the molded product is stressed.

Applications

LAMINATED PHENOLIC. S. W. Place. Product Eng. *11*, 360–3 (Aug. 1940). Considerations governing choice of cotton fabric, paper, asbestos, or glass as the base for laminated phenolics are discussed. The largest present use for glass-base material is in chemical applications because glass is practically immune to attack by most acids except hydrofluoric acid; it is not recommended where excellent electrical properties are required. For structural members a factor of safety of four is recommended for mechanical strength and for electrical insulating parts under dielectric stress, a factor of safety of six is recommended for dielectric strength.

ETHYL METHACRYLATE AS A MOUNTING MEDIUM FOR EMBRYOLOGICAL SPECIMENS. W. O. Puckett. Science *91*, 625–6 (June 28, 1940). Complete directions are given for preparing specimens.

USE OF PLASTIC AS A SUBSTITUTE FOR COVER GLASSES. V. Suntzeff and I. Smith. Science *92*, 17–8 (July 5, 1940). Cellulose acetate foil is used with isobutyl methacrylate polymer as a mounting medium.

Testing and Properties

THE ELECTRICAL PROPERTIES OF THERMOPLASTICS. L. Hartshorn, N. J. L. Megson, and E. Rushton. J. Soc. Chem. Ind. *59*, 129–33 (July 1940). The electrical properties of pure thermoplastic resins prepared by the condensation of phenol, *o*-, *m*-, and *p*-cresol, *m*-5-xylenol, and benzyl alcohol with formaldehyde were investigated. The changes of both power factor and dielectric constant are approximately proportional to the concentration of hydroxyl groups in the resin and are thought to be determined by rotation of these groups in the molecule.

SWELLING OF SYNTHETIC RUBBERS IN MINERAL OILS. F. H. Carman, P. O. Powers, and H. A. Robinson. Ind. and Eng. Chem. *32*, 1069–72 (Aug. 1940). Several synthetic rubber compositions were subjected to long-time immersion tests in various mineral oils. In general, the logarithm of the present volume change varied inversely with the cloud temperature of a 50 percent mixture of aniline and oil.

Coatings

ALKYD RESINS. A. E. Byrne. Can Chem. and Process Ind. *24*, 336–9 (July 1940). A review of the manufacture of alkyd resins and their applications in protective coatings.

HIGH TEMPERATURE LACQUERING. D. J. Stedtefeld. Metal Finishing *38*, 414–15 (July 1940). The technique for applying hot lacquers has been developed in order to spray heavier coatings of lacquers and thus reduce solvent costs. Lacquers with solids from 28 to 40 percent can now be sprayed using the hot process which requires special equipment. The advantages and specially designed equipment are discussed by the author.

PRECISION AND SPEED

WITH SOUTH BEND LATHES

To make a profit, in these highly competitive times, machine operations must be performed quickly and accurately. High spindle speeds and extreme rigidity are essential for efficient machining with sintered carbide or diamond tipped tools, especially when finishing die castings, plastics and other fast cutting materials. Precision and speed are therefore important factors to consider when selecting a lathe.

South Bend Lathes have extreme precision and ample speed for turning out work efficiently and profitably. They are giving satisfactory service in the tool rooms and production shops of America's topmost industries.

Features responsible for the excellent performance of South Bend Lathes include an alloy steel spindle with hardened and superfinished bearing surfaces, a one-piece double wall apron with steel gears running in oil, a powerful worm drive and multiple disc friction clutch for operating the power carriage feeds, and a direct belt drive to the spindle.

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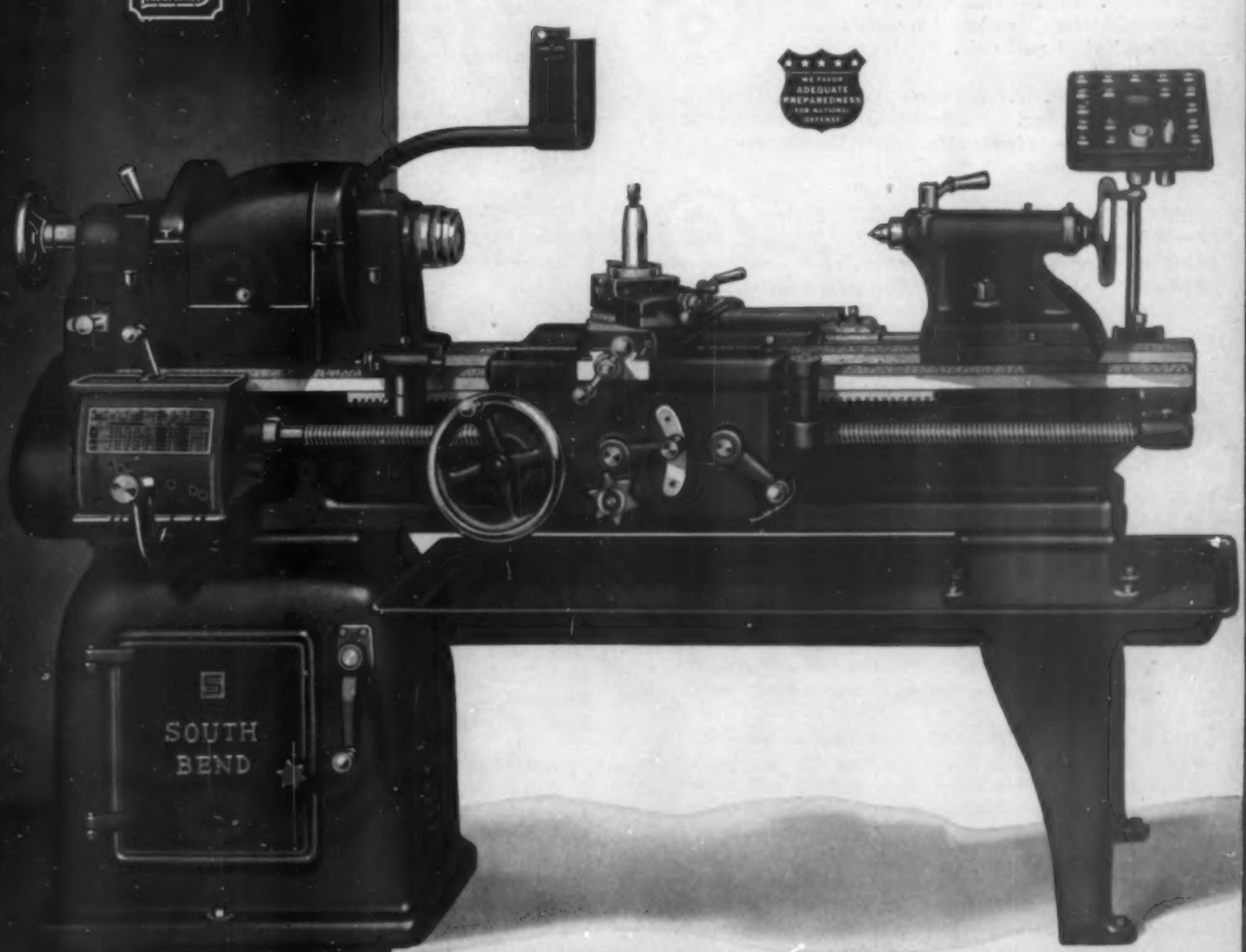

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U. S. Plastics Patents

Copies of these patents are available from the U. S. Patent Office, Washington, D. C. at 10 cents each.

RUBBERLIKE PRODUCT. F. Bitterich (to Reichhold Chemicals, Inc.). U. S. 2,211,048, Aug. 13. A thermosetting phenolic resin which is compatible with drying oils is heated with rubber to form a homogeneous reaction product.

KETONE RESIN. Wm. H. Moss (to Celanese Corp. of America). U. S. 2,211,070, Aug. 13. Making a resin by acid condensation of a phenol and a ketone and extracting with a chlorinated hydrocarbon to produce a very hard resin.

PROPELLER BLADE. Wm. H. Moss (to Celanese Corp. of America). U. S. 2,211,071, Aug. 13. A laminated propeller blade is made of fabric layers joined by a cellulose derivative.

LAMINATED FABRIC. G. Schneider (to Celanese Corp. of America). U. S. 2,211,079, Aug. 13. Joining fabric layers to a self-sustaining film of a filament-forming thermoplastic ester or ether.

PHOTOGRAPHIC COATING. C. R. Fordyce (to Eastman Kodak Co.). U. S. 2,211,323, Aug. 13. Forming a photosensitized emulsion by dispersing a silver halide in cast films of water-soluble polyvinylacetal resin.

PLASTICIZER. J. J. Gordon (to Eastman Kodak Co.). U. S. 2,211,327, Aug. 13. Plasticizing cellulose esters with *N*-dibutylacetamide, diacetamide, *N*-alkyldiacetamides or *N*-alkyldipropionamides.

PHOTOGRAPHIC COATING. G. F. Nadeau and A. D. Slack (to Eastman Kodak Co.). U. S. 2,211,346–7, Aug. 13. Coating photographic emulsion layers with a water-soluble cellulose ester or resin containing a sulphosuccinate ester or an isopropylnaphthalenesulphonate.

ELASTIC PRODUCTS. M. Mueller-Cunradi and W. Daniel (to Jasco, Inc.). U. S. 2,211,429, Aug. 13. Compounding rubber (natural or synthetic), polyisobutylene or a vinyl or acrylate resin with a phenolic, urea or vinyl resin powder made from a cellular (sponge) form of the resin.

NITROCELLULOSE PLASTIC. W. Reppe, F. Hoelscher, A. Mengér and E. Bock (to General Aniline and Film Corp.). U. S. 2,211,436, Aug. 13. Compounding nitrocellulose with water- or alcohol-soluble polyvinyl ether.

HOT MELT COATING. H. R. Dittmar (to E. I. du Pont de Nemours and Co.). U. S. 2,211,689, Aug. 13. A coating to be applied as a melt, without solvent, contains 60 percent of a butyl methacrylate polymer and 40 percent of damar gum.

ALDEHYDE RESINS. W. Zerweck and K. Keller (to I. G. Farb. Akt.). U. S. 2,211,709–10, Aug. 13. Condensing an aliphatic aldehyde (not higher than hexanal) with an amino-hydrazino- or di- or polyhydrazinotriazine, or with a di- or polyaminodiazine to form a resin.

BINDER. C. B. Nelson and I. Spinner (to Plastic Binding Corp.). U. S. 2,211,744, Aug. 13. Curling a thermoplastic material around an arbor while hot and then cooling in order to set the curvature.

ROSIN DERIVATIVE. P. J. Ryan and A. G. Hovey (to Reichhold Chemicals, Inc.). U. S. 2,211,913, Aug. 20. Condensing maleic anhydride with glycerol in a glass-lined kettle, and pouring the product slowly into a rosin melt in a metal kettle to produce a high-melting resin without discoloration.

WATER-REPELLENT FIBER. E. F. Izard (to E. I. du Pont de Nemours and Co.). U. S. 2,211,931, Aug. 20. Spinning viscose silk filaments from a viscose bath containing a wax and a diphenylolpropane-formaldehyde resin.

ALKYD RESIN. Israel Rosenblum. U. S. 2,211,938, Aug. 20. Stable alkyd resins, inert to basic pigments, are made from glycerol, a dibasic acid and heat-treated fatty oil acids.

BONDING RUBBER TO TIRE CORD. Wm. H. Charch; A. Hershberger; Dorothy B. Maney; F. M. Meigs; A. P. Tanberg (to E. I. du Pont de Nemours and Co.). U. S. 2,211,945; 2,211,948–9–50–1; 2,211,959; 2,211,960; 2,211,964, Aug. 20. Bonding rubber to rayon tire cord with polyvinyl alcohol and an aldehyde resin; forming a bonding resin *in situ* from an aldehyde and an amine, cyanamide or a ketone; forming the resin from urea and an aldehyde; using both a phenol and an amine in the aldehyde condensation; and using deacetylated chitin as the bonding agent.

FIBROUS FILLER. Martin J. Connolly. U. S. 2,212,226, Aug. 20. Using refined hemp hurds as filler in phenol-aldehyde resins.

SHOE HEEL. Bernard F. Convy. U. S. 2,212,263, Aug. 20. Forming transverse transparent polymethyl methacrylate inserts in opaque shoe heels.

CATHETER. G. W. Wallerich (to V. Mueller and Co.). U. S. 2,212,334, Aug. 20. Thin-walled catheter tubes, opaque to x-rays, are extruded from a cellulosic plastic containing an opacifier.

VARNISHED CAMBRIC. H. A. Letteron (to General Electric Co.). U. S. 2,212,400, Aug. 20. Cambric is sized with polystyrene, then coated and impregnated with an insulating varnish.

COLLAPSIBLE TUBE. Alois Brossette. U. S. 2,212,433, Aug. 20. Treating a transparent cellulose derivative foil with collodion, traumaticin and benzyl alcohol, then winding the foil on a core to form a tube.

SLIDE FASTENERS. D. Marinsky (to Whitehall Patents Corp.). U. S. 2,212,545, Aug. 27. Bonding molded plastic links of a slide fastener stringer to a fabric support by attaching a layer of similar plastic to the fabric and joining this layer to the links by solvent action.

GLOSS FILMS. C. B. Hollabaugh (to Hercules Powder Co.). U. S. 2,212,603, Aug. 27. Adding 0.5 to 1.25 wt.-percent of a long chain sodium alkylsulphate to cellulosic, chlorinated rubber or synthetic resin finishes.

ADHESIVE. A. B. Macdonald (to B. B. Chemical Co.). U. S. 2,212,611, Aug. 27. In a chloroprene cement a zinc chloride.phenylhydrazine double salt serves to preserve tackiness for a time after the cement is spread on a surface.

DURITE

Honored by Plastics Competition

DURITE proves its worth in the stiffest Modern Plastics Competition ever held. As the material used in the thermostat* molded for the Wilcolator Company, well-known manufacturers of heat control devices, it has been honored by the Judges of the 1940 Modern Plastics Competition.

The heat resistance and insulation, and great dielectric strength of DURITE molding material are put to good use in this honored piece. Contact casing, dial and two oven circuit controls have excellent surface finish. And they will never peel, chip, dent or fade.

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DURITE PLASTICS

REG. U. S. PAT. OFF.

FRANKFORD STATION, P. O., PHILADELPHIA, PA

Foreign Plastics Patents

Application dates are given for patents of European countries, but for Canada the issue date is given

THERMOPLASTIC. E. P. Irany (to Shawinigan Chemicals, Ltd.). Canadian Patent 387,669, March 26, 1940. Improving the form stability of polyvinyl resins by compounding with a fusible phenolic resin.

MOLDING POWDER. Bela Bartfay. Hungarian Patent 121,977, Nov. 2, 1939. Fillers such as lignin or proteins are impregnated with urea or a phenol or the like, then treated with formaldehyde and dried.

POWDERED RESIN. V. V. Malyshev, I. D. Abramson and D. L. Bokhan. Russian Patent 51,858, Sept. 30, 1937. Spray-drying a solution or dispersion of a resin, with or without plasticizers.

MODIFIED ALKYDS. S. N. Ushakov. Russian Patent 51,730, Sept. 30, 1937. A phenol-aldehyde resin of the novolak type, in presence or absence of polyhydric alcohols, is condensed with a polybasic acid.

AMINE RESINS. G. S. Petrov. Russian Patent 51,859, Sept. 30, 1937. Condensing arylamines with aliphatic aldehydes, first at a moderate temperature without a catalyst and then at a higher temperature with an acid catalyst.

VINYL ESTERS. O. Nicodemus and W. Weibezahn; H. Lange and O. Dorrer; O. Nicodemus, H. Lange and O. Horn (to I. G. Farb. Akt.). Canadian Patent 390,205-6-7-8, July 23, 1940. Making vinyl acetate, crotonate, butyrate, formate, oxalate, fumarate or maleate by action of acetylene on the corresponding acids in presence of a mercury compound and boric acid or anhydride, with or without boron trifluoride and hydrogen fluoride.

SURGICAL PREPARATIONS. W. O. Herrmann, B. Braun and W. Haehnel (to Chemische Forschungsgesellschaft). Canadian Patent 390,210, July 23, 1940. Using polyvinyl alcohol or its water-soluble derivatives in plastic fillings for natural or surgical body cavities.

POLYETHYLENE MOLDINGS. E. W. Fawcett, R. O. Gibson, M. W. Perrin, J. G. Paton and E. G. Williams (to Imperial Chemical Industries, Ltd.). Canadian Patent 390,359. July 30, 1940. Injection molding of ethylene polymers suitably compounded with fillers, pigments or opacifiers.

SAFETY GLASS. Adolf Kämpfer. Canadian Patent 390,445. July 30, 1940. Polymerizing unsaturated esters in presence of high-boiling water-repellent organic compounds for use as safety glass interlayers.

UREA RESIN. Lucien Segond and Paul Michaut. German Patent 684,944, Dec. 8, 1939. Condensing urea with formaldehyde in presence of zinc and a sulphonamide.

LUTING COMPOSITION. Ernst Schnabel. German Patent 684,836, Dec. 6, 1939. Use of polyvinyl alcohol, softened with glycerol and suitably compounded with reinforcing fillers, for luting.

VINYL RESIN MOLDINGS. I. G. Farb. Akt. British Patent 508,851, July 4, 1939. Polyvinyl chloride or an interpolymer thereof with another vinyl compound is treated with 0.5 to 5% of sulphur and molded by a thermoplastic method.

DECORATIVE PANELS. Societe Anonyme Cristallex. British Patent 508,791, July 3, 1939. Coating wood, cork, asbestos cement, slate or marble panels or plates with polyvinyl chloroacetate powder and forming the powder into a film under heat and pressure.

HARDENABLE RESIN. Kurt Albert G. m. b. H. Chemische Fabriken. German Patent 684,225, Nov. 24, 1939; addition to 605,917. Forming a thermosetting resin by condensing diphenylolpropane with formaldehyde in presence of a drying, semidrying or nondrying oil.

BUILDING MATERIAL. George Schuster and Franz Hoffmann. German Patent 684,633, Nov. 1, 1939; addition to 675,177. Paper fiber used as filler to make building material from an aqueous dispersion of a synthetic resin or a thermoplastic.

ACETAL RESINS. Fiberloid Corp. British Patent 509,596 and 509,696, July 17, 1939. Making polyvinyl acetal resins suitable for safety glass interlayers by compounding the resin with a blend of plasticizers designed to give equal hot and cold break tests, e. g., butyl laurate and dibutyl phthalate, or with mixed glycol esters such as diethyleneglycol propionate-butyrate or propionate-phthalate.

SYNTHETIC BALSAM. L. C. F. Pechin. Belgian Patent 433,304, April 29, 1939. Balsams for optical use or safety glass adhesives made by condensing borophenates with formaldehyde.

DENTURES. Dirk Hessels. British Patent 509,667, July 19, 1939. Dentures made of polyacrylate or polymethacrylate resins are molded from the clear transparent resin, but with the tooth-receiving portions pigmented to form opaque areas.

MOLDINGS. J. van Hüllen and W. Wellman (Niederrheinische Maschinenfabrik and I. G. Farb. Akt.). British Patent 510,157, July 24, 1939. Use of a cellulosic filler such as sawdust or flax chaff in polyacrylate or polyvinyl resin molding compounds.

THERMOPLASTICS. I. G. Farb. Akt. French Patent 841,724, May 25, 1939. Dispersing powdered thermoplastics in a plasticizer and gelatinizing the mixture by heating it in an open or closed mold.

Correction of number erroneously given on page 66, July 1940 issue on the following patent:

ABRASIVE WHEEL. E. T. Rainier (to Dominion Rubber Co., Ltd.). Canadian Patent 387,523, March 19, 1940. A hardened phenolic resin, containing potassium chloride, is used as binder in abrasive wheels.

NATIONAL RESEARCH CREATES NEW PRODUCTS ★ NEW MARKETS

LONG LIVE

Jackson Soldering Pencils

..thanks to

PHENOLITE

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Laminated BAKELITE

JACKSON Electro Corporation of Brooklyn, N.Y. were having difficulty with the performance of their soldering pencils. This was due to the brittleness and heat transfering qualities of the porcelain bushing used to insulate the wooden handle of the soldering pencil from the hot metallic element.

The porcelain bushing would break . . . the handle would char, quickly resulting in an unusable article. National engineers recommended the use of asbestos base (heat resisting) "Phenolite" laminated bakelite to replace the porcelain bushings. The result: practically indefinite product life . . . widely increased sales.

Whether it is a tiny bushing or a large heavy duty gear, or one of a thousand products, Phenolite is constantly demonstrating its ability to withstand the kind of punishment other materials can't take. And National engineers are demonstrating also their ability to work with industry in the manufacture of better products through the use of Phenolite and National Vulcanized Fibre. We invite your inquiry.

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We need as many hands as a Buddha god—

Photograph by Wesley Bowman

Four to slap the backs of our customers for winning four awards in the 1940 Modern Plastics Competition, and two to hold on to our hat—because WE'RE GOING PLACES!

It isn't every big plastic molding company that can win as consistently, and present so many diversified plastic molding applications as we do year in and year out.

And we are able to cover the greater number of groups as outlined in the Modern Plastics Competition Entry Blank, because our Research and Development Department has successfully cooperated with those who have come to us with an embryonic idea.

True, some of these ideas were not applicable plastic molding jobs. However, after consideration, some were found flexible enough to be redesigned for plastic molding.

On the opposite page we present the 1940 winners of the Modern Plastics Competition.

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Speed-O-Scope

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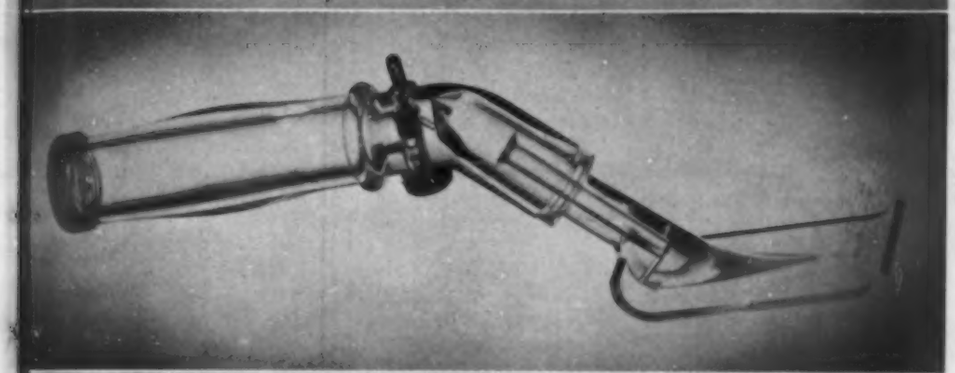
The duplicator has long been used in the office for making charts, forms, sales letters, diagrams, illustrations, etc. etc., and the Speed-O-Scope is ideal for producing the necessary stencils.

Formerly made of wood and metal, Plastic Molding was found to be the practical and economical way to produce the Speed-O-Scope. Molded of lustrous black Bakelite the Speed-O-Scope blends perfectly with other pieces of office equipment. Its new design incorporated new devices that simplified the cutting of stencils.

Molded for Speed-O-Print Corporation, Chicago, Illinois.



Fallier

Industrial Group:

Auto body and fender repair men will welcome this new plastic molded Fallier Fountain Leading Paddle for leading dents and bumps. Being almost impervious to oil absorption, the plastic molded material with an oily surface will not stick to lead that is in a workable state. Pressing the thumb valve two or three times releases just enough oil to lubricate the base of the paddle. Molded for Fallier Fountain Leading Company, Denver, Colorado.

Argoflex

Scientific Group:

A precision job that required expert knowledge in mold making and experienced molding technique. Molded in two separate parts, the body or box proper, and an L shaped back which is fastened to the body by a molded door type hinge. A molded cover flange makes light leakage impossible. This, the Argoflex, is America's first all molded twin lens reflex camera. Molded of black Durez for International Research Corporation, Ann Arbor, Michigan.

Burton

Scientific Group:

Designed by Barnes & Reinecke the Burton-Fresnal Spotlight is another achievement in precision molding. Used by doctors and amateur photographers, this small unit throws a high tensity beam where it's wanted. Ventilation is by convection, heat escaping through the molded-in grill at the top of the spotlight. Molded for Burton Manufacturing Company, Chicago, Illinois.

PRODUCTS CORP.

CHICAGO, ILLINOIS

Publications

Write direct to the publishers for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery. Other books will be sent postpaid at the publishers' advertised prices

Plastics in Engineering

by J. Delmonte
Published by Penton Publishing Co., Cleveland, 1940
Price $7.50 **616 pages, 101 illustrations**

There is none of the glamor of the plastics industry in Delmonte's book. On the contrary, it presents a frank and timely discussion of facts which should be considered by manufacturers and engineers in selecting plastics for their needs. It is well known that there has been much grief resulting from improperly designed moldings or the use of the wrong material. This may have been a necessary burden to be carried by the pioneers in the use of plastics. Now, however, a background of experience has been accumulated which should practically limit the accident record in plastics applications to those attributable to proceeding against stop signs or jaywalking. True, there is still plenty of room for courageous and pioneering undertakings in the utilization of plastics, but there is no need to ignore the red lights which other pathfinders have left along the trail. Delmonte, in the capacity of engineer for a firm which has adapted plastics to many of their products, has had ample opportunity to consider critically the merits of these newcomers to the industrial field and has incorporated the stop and caution signals as well as the go signs in his book.

Most of the conventional angles of plastics are covered, including descriptions of the materials, equipment and processes employed in the industry, construction and design of molds and detailed discussions of important applications. Borderline subjects, which are necessarily of interest at least to the manufacturers of synthetic plastics, are represented by chapters on surface coatings and synthetic rubbers. Unusual or unorthodox features are typified by chapters on "Common Failures and Defects in Plastic Materials" and "Comparative Costs of Plastics and Molds." There are numerous typographical errors throughout the book, but factual misstatements are relatively few and minor in nature.

The author's conservative approach is perhaps best illustrated by his statement on page 1 that "Organic plastics are not offered as panacea for all problems" and on page 164 that "Engineers and designers must be careful about casual reception to some claims made for newly developed plastic materials." However, his book exudes a confidence in the "profound economic significance" of plastics as "engineering materials of construction" which will "compete with or supplement existing designs employing either wood, ferrous or nonferrous alloys." It is heavy reading, but should be on the "must" list of all engineers responsible for keeping their company's products up to date. G. M. K.

Die-Castings

by Arthur Street
Chemical Publishing Co., Inc., 148 Lafayette St., New York, 1939
Price $1.75 **160 pages**

This book, prepared by an English author, is intended as a manual for the user, buyer, and designer of die-castings. A brief chapter deals with the combination of plastics with die-castings.

Physical Constants of Hydrocarbons. Vol. II. Cyclanes, Cyclenes, Cyclynes, and Other Alicyclic Hydrocarbons

by Gustav Egloff
American Chem. Soc. Monograph No. 78
Reinhold Publishing Corp., 330 W. 42nd St., New York, 1940
Price $12.00 **605 pages**

A review of Vol. I of this treatise was published in the May 1939 issue of MODERN PLASTICS. This second volume tabulates the melting points, boiling points, specific gravities, and indices of refraction of the nonbenzenoid cyclic hydrocarbons. Petroleum is the greatest potential source of these naphthenes which may well be the basis of a new phase in the development of the chemical industry, following present activity in synthesis from aliphatic hydrocarbons. This collation of physical constants has been made to facilitate and energize such research. G. M. K.

● A 44-PAGE BEAUTIFULLY ILLUSTRATED BOOKlet, entitled "Plexiglas," issued by Röhm and Haas Co., Inc., 222 West Washington Sq., Philadelphia, Pa., gives complete coverage of the characteristics and diversified application of this plastic material. Written in a readable and informative style, the booklet will be distributed, without charge, to all interested executives. Data on Crystalite compression and injection methods are included and there are tables listing optical, physical, electrical and chemical properties of the acrylic.

● A 12-PAGE BULLETIN OF INTEREST TO USERS OF molded plastics has been published by the plastics division of Erie Resistor Corp., 1640 W. 12th St., Erie, Pa. In addition to giving information on injection molded plastics this catalog describes the designing, engineering and plastics production facilities of the company.

● SUITABLE FOR PREMIUMS, GIFTS AND HOME utility, flashlights, leveling spoons, hotel key tags and animals in miniature are among the many stock mold items listed in the new illustrated folder recently issued by Gits Molding Corp., 4600 W. Huron St., Chicago, Ill.

● TWENTY-FOUR PAGES TELL THE STORY OF "MAchines of tomorrow" with many large illustrations of equipment of Hack Machine Co., 1228 Harding Ave., Des Plaines, Ill. The catalog deals with the Multi-Versal tool room machine reported capable of some 30 independent cutting operations.

● A NEW 24-PAGE BOOK, ILLUSTRATING AND DEscribing gas-fired and electric industrial ovens, has just been issued by Kirk & Blum Manufacturing Co., Cincinnati, Ohio, designer, fabricator and installation contractor for sheet metal equipment. It contains information regarding faster and more economical drying, baking and enameling operations.

● CHEMICAL GROUP FOLDER NO. 2 ON "GLYCOLS," another of a series of folders which present the properties, uses and possibilities of organic chemical families has been issued by Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York. In this latest folder, ethylene glycol, several polyethylene glycols, propylene glycol and dipropylene glycol are described, and a table of reference data on commonly used physical constants and solubilities of these glycols is given. The folder will be of interest to those using or manufacturing humectants, solvents, anti-freezes, resin intermediates, coupling agents and liquid coolants. (*Please turn to page 174*)

Announcing

1941 MODERN PLASTICS CATALOG & DIRECTORY

The 1941 Modern Plastics Catalog & Directory is big news to plastics users and manufacturers. The first Catalog to be issued separately and not included with a subscription to *Modern Plastics*, this huge volume will sell for only $3.50.

WHAT THE 1941 MODERN PLASTICS CATALOG WILL BE

The 1941 Catalog will be the complete encyclopedia and textbook of the plastics industry. It will list the important developments of the past year and point out the possibilities of the various plastic materials now on the market. It will serve as a guide and a reference book for engineers and designers within the industry. It will be a handbook necessary to every buyer and user of plastics.

In short, this book will be indispensable to anyone interested in, or engaged in, the plastics field.

The plastic properties chart will encompass every type of plastic material on the market. There will be two new charts on (1) plasticizers and (2) solvents. There will be a new section on laminates.

Every type of plastic material will be described in separate articles. Every molding and fabricating process will be described. Plant set-up and equipment get an entire section.

The Directory section will include scores of new names of plastics manufacturers. The molders' marks section enables the reader to identify the molder of any piece.

Last year this book was sold out, out of print in 2 weeks from the date of publication. Many hundreds of people were disappointed. We urge our friends not to suffer the same experience this year. You can insure getting your copy by reserving it now.

PRICE $3.50

1941 MODERN PLASTICS CATALOG and DIRECTORY

PUBLISHED BY THE BRESKIN PUBLISHING CORPORATION

CHANIN BUILDING • 122 EAST 42nd ST. • NEW YORK CITY

TAYLOR FIBRE WINS MODERN

TAYLOR

COMPANY

PLASTICS' *Highest Award*

(TRANSPORTATION GROUP)

With This Airplane Tab for Glenn L. Martin Company

An improved product (lighter, stronger, more rigid), mass production facilitated, costs reduced, again, by phenol fabric construction.

This airplane tab is inserted in aileron and tail surfaces and is used to "trim ship" on level flight and to increase maneuverability at excessive speeds.

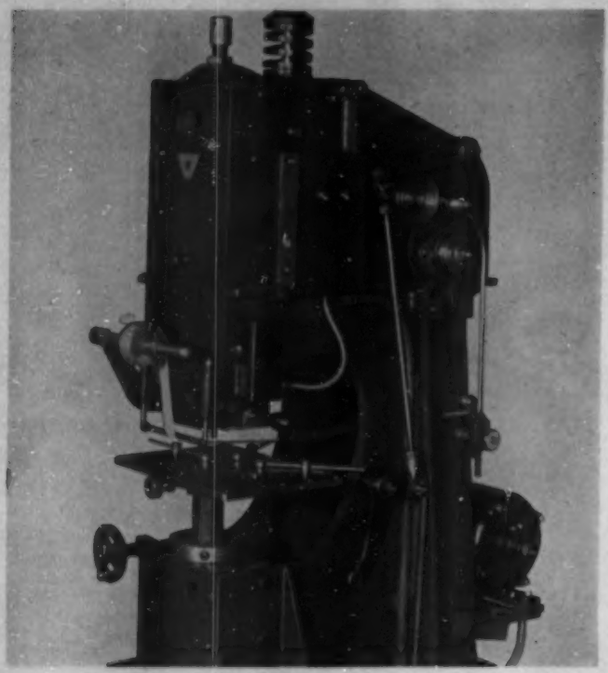
Taylor ingenuity — advised of the problem — developed the means of production, and the finished product to answer all requirements.

Do you know what this most modern mill of its kind in the world offers you in the production and fabrication of Phenol Fibre and vulcanized Fibre into parts for your manufacturing requirements? It will pay you to find out.

TAYLOR FIBRE COMPANY
NORRISTOWN, PA.

FIBRE COMPANY

Machinery and Equipment



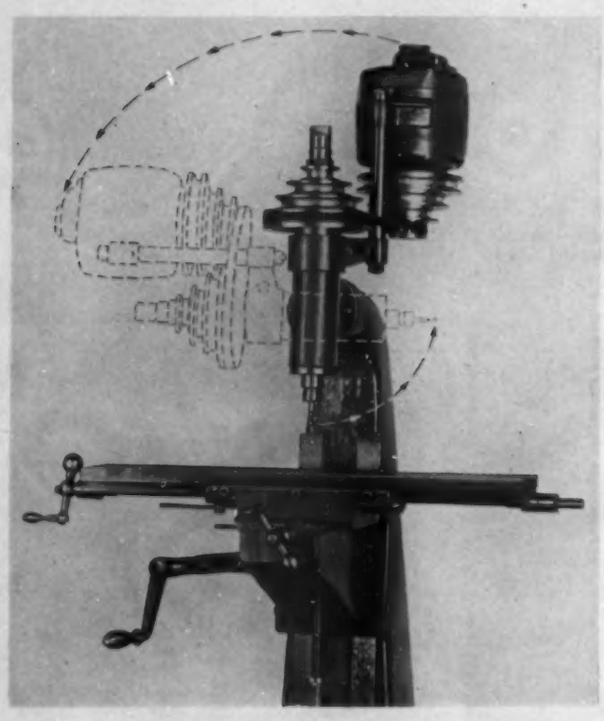
● GRIFFIN, CAMPBELL, HAYES, WALSH, INC., announces a new, complete, electrically operated unit (pictured above) designated as Brighten Leaf "Model GB-2" hot stamping equipment, designed especially for stamping gold or pigmented leaf on molded plastics. A unique feature is a *compensating device* that is reported to allow for variations naturally present in the great variety of plastics. There is also an *impression control* that provides for varying thicknesses in different types of work and for the time of dwell at the bottom of the stroke. Other features claimed for the machine are quick conversion from straight stamping to dial feed; variable speed drive; thermostatic heat control and a specially designed one-revolutionary friction clutch with automatic brake for safety. The machine, made in welded assembly, has an overall height of 6½ ft.; requires 4 by 6 ft. floor space; weighs 1160 pounds.

● MANUFACTURERS SCREW PRODUCTS ANNOUNCES that it now regularly furnishes all machine screw nuts chamfered on both sides. It is claimed that this processing turns out a product as fully finished as a milled nut. A better appearing nut, free from burrs and easier to use since it now makes no difference which side is up. Stock is regularly maintained in steel and brass, plain or plated in cadmium and nickel finish. Other finishes can also be had. Sizes range from 2-56 and up. Package stock from a gross on up to full container kegs are available.

● GEORGE SCHERR CO., INC., REPORTS THAT IT HAS added the Mechanic's Own set to its line of Ultra-Chex precision length standards. Designed as a unit for the toolmaker's and mechanic's tool box, this small five-block set is said to enable the individual mechanic to produce a given tool, fixture, jig, gage or work piece correct to specified accuracy limits.

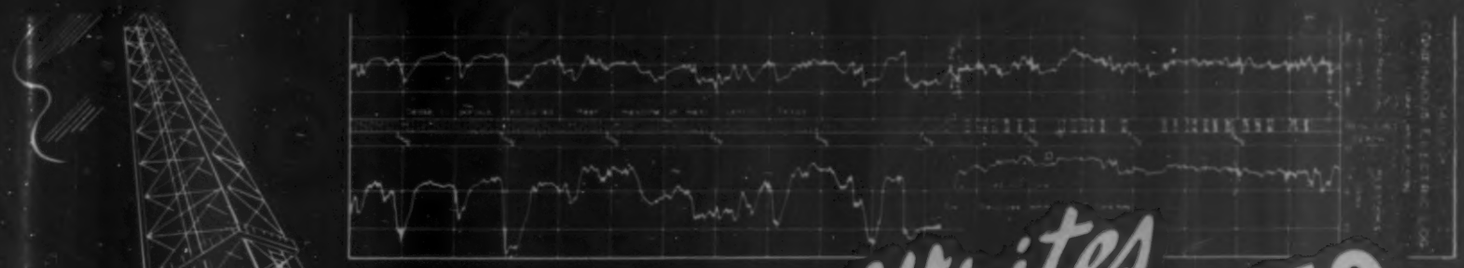
● W. M. ACKER ORGANIZATION, INC., ANNOUNCES A new automatic deaerating and equalizing system for steam drainage and boiler feeding. An important function of the systems, it is claimed, is their ability to deaerate water fed to boilers—effective liberation of oxygen and non-condensable gases which are detrimental to metal under heat and pressure. These systems are said to save fuel and water, allow efficient steam travel, convey liquids at low cost and increase production.

● PHOTOSWITCH ELECTRONIC TIMER TYPE T15 IS a universal interval timer claimed to be accurate over ranges from 1/30 sec. to 2 minutes. Control is accomplished through a specially designed snap-action relay of 1,000 watts capacity. The equipment is said to be flexible with reference to actuating control, permitting both momentary push button and sustaining contacts control. It is universal for 6 timing ranges represented by timing valves snapped into a readily accessible clip. It was designed to permit complete interchangeability of equipment.

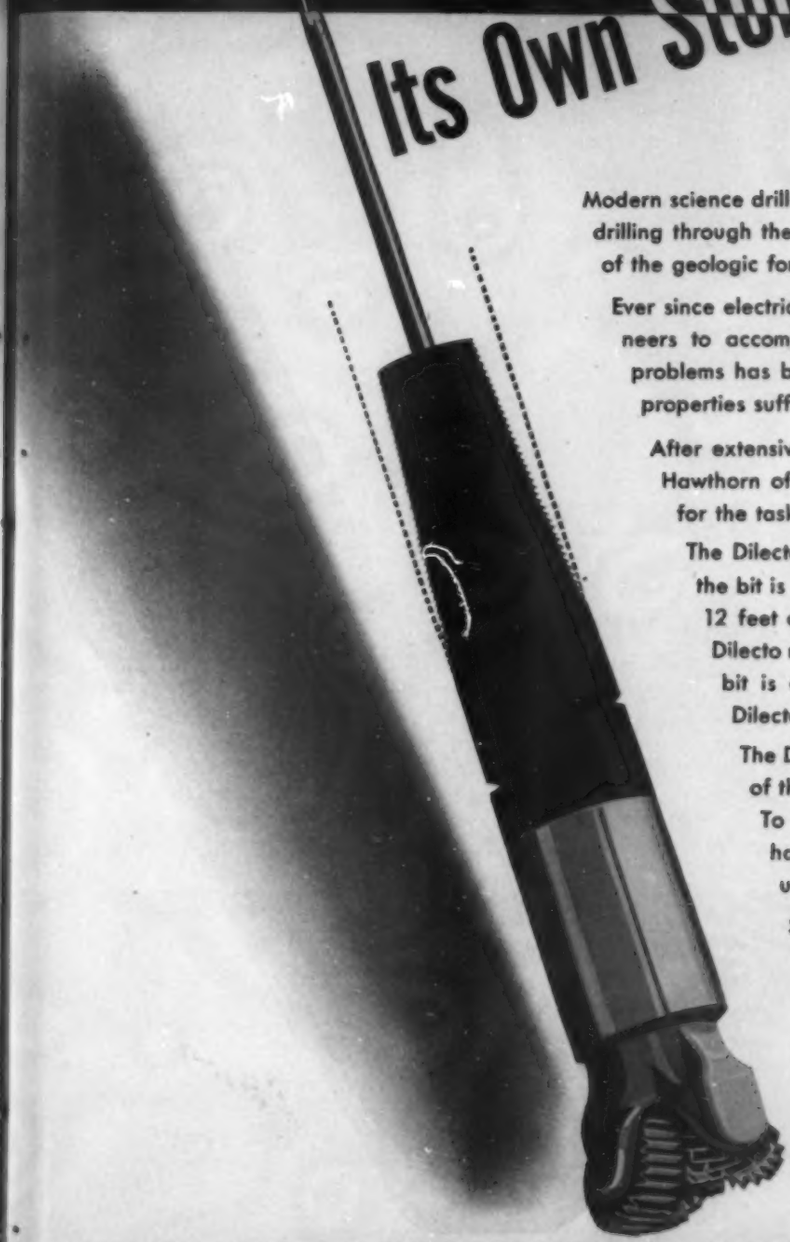


● UNIVERTICAL HIGH SPEED END MILLING MAchine has a 37 in. swivel head graduated to a range of 90 deg. either way of the perpendicular (as shown above) and is claimed to be able to perform many small precision jobs. A bench type machine with a base 11 in. by 17 in., it is powered by a heavy-duty 1/4 hp. motor, has a 4-speed V-belt pulley for handling intricate milling, is said to mill an 8 by 16 die at one setting and is designed for the use of cutting tools up to 5/8 in. It is also claimed adaptable to grinding operations. Maximum lift of the tabe to end of the swivel head spindle is 10 in. with a work clearance of 6 1/2 in. Table, 34 in. by 4 7/8 in. with T slots, has a cross travel of 17 in. with a forward and back travel of 7 in. with all table movements graduated to 0.001 inch.

(*Please turn to page 168*)



The Earth Writes Its Own Story with DILECTO



Modern science drills deep into the earth to get the precious oil stored by time. While drilling through the different strata, electrical impulses now give a constant record of the geologic formations through the invention of modern electrical logging.

Ever since electrical logging was first developed it has been the hope of Oil Engineers to accomplish simultaneous drilling and logging. One of the toughest problems has been to secure electrical insulating material with the mechanical properties sufficient to withstand loads even exceeding 1,000,000 pounds.

After extensive tests at a leading university, under the direction of Mr. D. G. Hawthorn of Amerada Petroleum Corporation laminated *Dilecto* was chosen for the task because of its great shear and dielectric strength.

The Dilecto Insulation covers the bottom section of the drill stem to which the bit is attached. This drill stem is a hardened steel tube. Approximately 12 feet of the bottom section is covered with the Dilecto Insulation. The Dilecto must transmit the drilling force, applied to the stem, to the bit. The bit is attached to the drill stem solely by the threaded end of the Dilecto Insulation.

The Dilecto Insulation has the tremendous job of transmitting hundreds of thousands of pounds of driving force from the drill stem to the bit. To accomplish this job the Dilecto must completely adhere to the hardened steel tube, and the Dilecto threads must withstand ultimate shearing loads upward of 5,500 pounds per square inch.

Six wells more than a mile deep have now been drilled to test the practicability of the system. Five Dilecto jackets have been used, and two are still not worn out. Average drilling life has been about 7,500 feet per jacket, which is considered extremely satisfactory.

Again the Continental-Diamond Laboratory has proved its ability to help industry solve unusual problems. We welcome the opportunity to work with you in accomplishing similar results.

CONTINENTAL-DIAMOND FIBRE CO., NEWARK, DEL.

CD Products

DILECTO—A laminated plastic possessing unusual insulating and mechanical properties.

DIAMOND vulcanized FIBRE—A tough, hard, bone-like material of high dielectric strength.

CELLULAK—A specially laminated tubing with high dielectric strength and resistance to flashover.

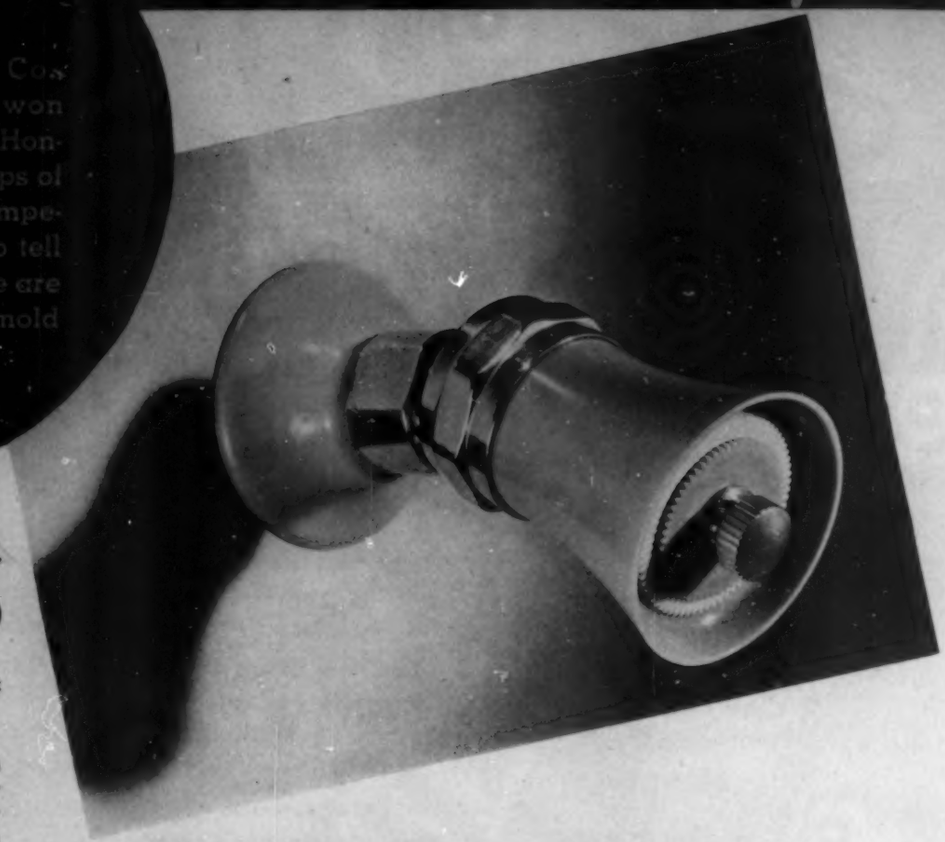
VULCOID—A laminated fibrous base material highly resistant to atmospheric conditions and moisture.

MICABOND—Has all the good qualities of mica plus adaptability. Sheets, rings formed or punched parts.

CELORON—A molded phenolic fabric base material of exceptional mechanical strength yet very light in weight.

Four-Star Triumph

The Standard Products Co.'s Thermo Plastics Division won three Top Awards and one Honorable Mention in four groups of the 1940 Modern Plastics Competition. We take this space to tell our customers how proud we are to have been chosen to mold these prize-winning pieces.



SHOWER HEAD

Molded for Mueller Brass Company, Port Huron, Michigan

This is one of the finest achievements of modern injection molding. These patented shower heads are compact and colorful. More, they are accurate to a hair, as all needle showers must be.

By injection molding we have been able to give the Meuller Brass Company metal milled accuracy, with rapid molding cycles. Merchandising advantages: the color possibilities of the materials makes it possible for each housewife to match her bathroom decorations. These shower heads have revolutionized the buying habits of decorators and consumers and are being sold in tremendous quantities throughout the country.

INSTRUMENT PANEL

Molded for the Aeronautical Corporation of America, Middletown, Ohio.

This is the first time that modern plastics have ever been used in this application to dress up the interior of an airplane. The instrument panel is molded in cream-colored materials. Four sections are used to frame the various instruments. Each of these sections are much lighter in weight than any other finish material and the improvement in the appearance of the cabin's interior has been so marked, according to the manufacturers, that a tremendous sales' increase is anticipated. For it was with this view that the plastic was chosen: to merchandise the airplane in the same way that automobiles are sold, through modern styling and beauty.

in Thermoplastics

RADIO HOUSING

Molded for Philco Radio & Television Corporation

Philco needed a cabinet which would combine minimum weight, maximum durability and compelling eye appeal for this new portable radio. Thermal plastic material was chosen because of its toughness and color possibilities. The weight of the housing is negligible, the walls are so thin that the outside measures only slightly more than the interior—yet the cabinet is strong enough to withstand the knocking about which any portable radio must get. An ingenious feature of the design is the incorporation of a loop antenna in the carrying strap.

JEWELITE DOOR KNOBS

Molded for Keystone Brass & Rubber Co., Philadelphia, Pa.

These patented door knobs fill a long-felt need for colored door-knobs. Being molded, they are made hollow in two pieces. The design is on the interior and the exterior is perfectly smooth, not dirt-catching and resistant to the usual abrasives of cleaning. The knob is light, practically unbreakable and extremely economical to manufacture because of the hollow-shell design. Reception by the trade has been enthusiastic, and a large volume of business is indicated for the future.

These prize-winners are only examples of the unusual work being done in thermoplastics in our plant. Bring us your plastic problem for an attractive and economical solution.

STANDARD PRODUCTS COMPANY

THERMO-PLASTICS DIVISION

505 Boulevard Building, Detroit, Michigan · · · · Factory: St. Clair, Michigan

In The Limelight

● BAKELITE CORP., UNIT OF UNION CARBIDE & Carbon Co., announces that on October 1st, Robert E. Brannan became manager of Molding Material Sales with offices at 30 E. 42nd St., New York City. For the past ten years Mr. Brannan has been in charge of the company's Chicago office. He joined the organization on January 1, 1923, and his first five years were spent in developing the process of making formaldehyde. The company reports that the appointment was made necessary due to the increasing volume of molding material business and the variety of molding materials which are now being manufactured.

● WORCESTER MOULDED PLASTICS CO., WORCESTER Mass., report that A. A. Anderson will be its sales representative in the New York area with headquarters at 17 E. 42nd St., New York City.

● WE ARE INFORMED THAT THE DOW CHEMICAL Co., Midland, Mich., is now prepared for the first time to accept orders for commercial quantities of ethyl cellulose molding material at a price reduction of 1 to 3¢ per pound.

● DEPENDENCE ON FOREIGN SOURCES FOR THIOurea, an essential chemical used in the metal, plastics, photographic, textile and chemical industries, has now been eliminated by its manufacture here on a large scale by the American Cyanamid Co., it has been announced. Heretofore the market has been supplied by importations from abroad. Production of thiourea in the United States, now for the first time on a commercial scale, is particularly important since demand for it is increasing rapidly as new uses are discovered. Its previous high cost has impeded full development of its applications.

The metal finishing industry uses thiourea as an inhibitor in pickling baths to control the etching action of the acid on metal surfaces. More than 171 U. S. and foreign patents describe the applications of thiourea in synthetic amino plastics, to which it is said to impart superior resistance to water, acids and alkalis.

● COUMARONE INDENE RESINS IN A WIDE RANGE of colors are being manufactured by Pennsylvania Industrial Chemical Co., Clairton, Pa., we are informed by Weller Chemical Co., 141 Milk St., Boston, Mass., New England representatives. Standard Chemical Co., Akron, Ohio, are national distributors. They also supply Picollyte resins–hydrocarbon thermoplastic terpenes—said to be acid-resistant, unsaponifiable non-yellowing, chemically inert, pale-colored and petroleum soluble. These are suggested by the company for uses such as coatings, laminating, modifying agents, cold molding binding mediums and other fields.

● C. D. KERR, JR., FORMERLY ASSOCIATED WITH the Charles F. Hubbs Paper Company, has been appointed sales representative in New Jersey, New York, and Eastern Pennsylvania for the Manufacturers Chemical Corporation.

● LEWIS NIXON, HEAD AND FOUNDER OF THE Nixon Nitration Co., a pioneer in naval architecture, died on September 23rd. Mr. Nixon, who was 79 years old, and an outstanding figure in the designing of warships was internationally known in governmental and industrial circles.

● WE LEARN WITH DEEP REGRET OF THE SUDDEN death on August 24, at Rochester, Minn., of William H. Mason, inventor of the Masonite process and former vice-president of the Masonite Corp. and a prominent figure in the industry.

● THE CHEMICAL AND CHEMISTRY ENGINEERING Department of Lehigh University are preparing to present a one-day symposium on "Cast Phenolic Plastics and Synthetic Resins," under the chairmanship of H. A. Neville, head of the department. Lectures, accompanied by motion pictures, will be given in the auditorium of the university at Bethlehem, Pa., on October 25, 1940, beginning at 2 p.m. Particular emphasis will be devoted to the subject of synthetic resins as applied to aircraft construction. The talks will be supplemented by an extensive exhibit display of products made from plastics. Invitations to attend this very instructive session are being forwarded to technicians, chemists, engineers, industrial manufacturers and all executives interested in the progress of modern plastics.

The following is the program as planned: 2 p.m. Afternoon Session: "Welcome to Lehigh" by Dr. C. C. Williams, president of Lehigh University. "Production and Uses of Cast Phenolic Resins," by W. R. Thompson, Technical Director, Catalin Corp. Moving Picture, "The Magic of Modern Plastics," by MODERN PLASTICS magazine. "Properties and Uses of Urea Formaldehyde Resins," by Dr. M. H. Bigelow, Technical Advisor, Plaskon Company.

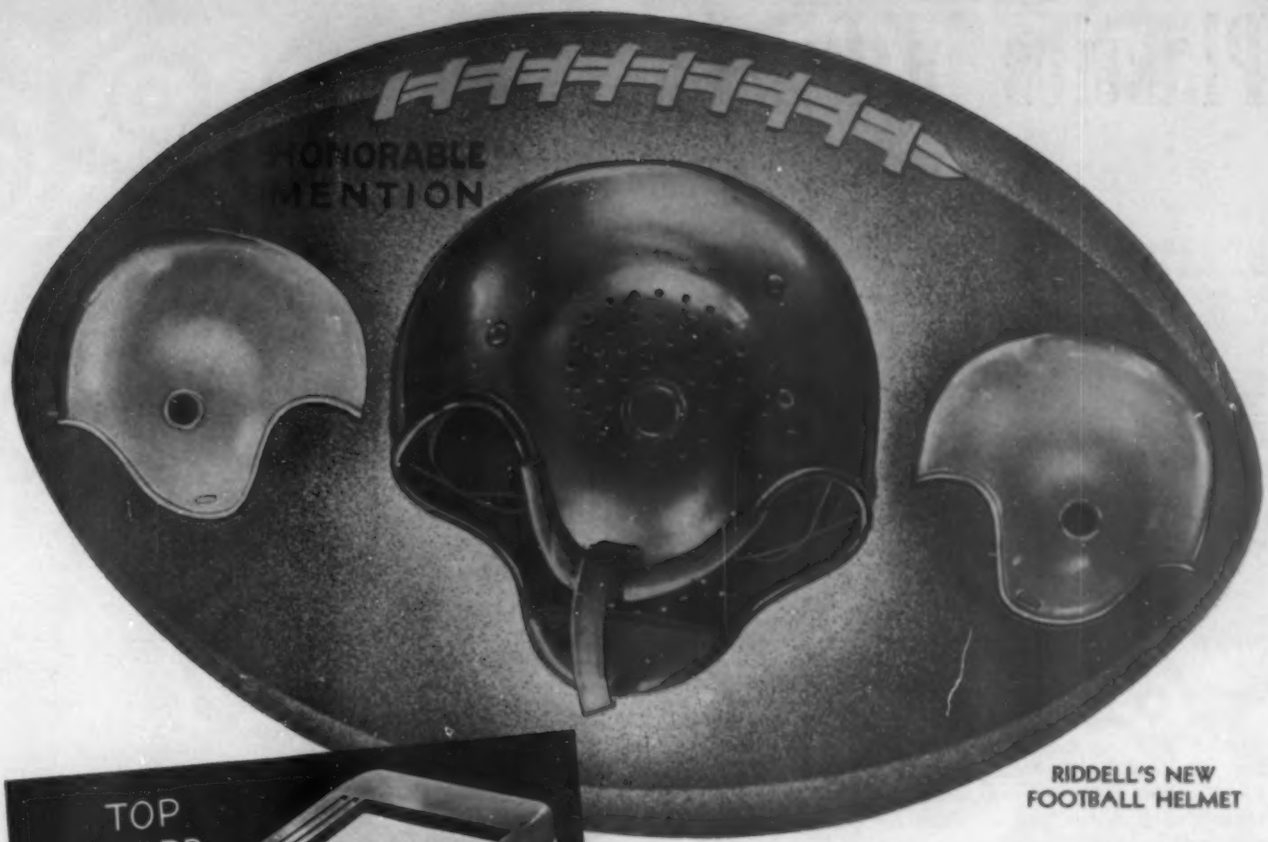
8 p.m. Evening Session: "Synthetic Resins in Airplane Construction." Speaker is H. N. Haut, Chief Inspector of Bellanca Aircraft Corp. "Synthetic Resin Coatings," by J. McE. Sanderson, Technical Service Dept., American Cyanamid Co. "The Changing Fashions in Polymers," by Dr. R. H. Kienle, Research Director of Calco Chemical Company.

● BAKELITE CORP., UNIT OF UNION CARBIDE AND Carbon Corp., New York, will sponsor two technical meetings on plastics and synthetic resinous products at the Chicago Museum of Science and Industry on October 21 and 23. These meetings will be held in conjunction with the Bakelite Plastics Travelcade which was installed in the Museum and opened to the public on October 1, 1940. The program for the two meetings consists of the following: October 21, 1940: *New Developments in Molding Plastics*, Chairman, John F. Calef, Chief Chemist, Automatic Electric Co.; "Engineering Factors of Plastics in Product Design" by Jean Otis Reinecke, Industrial Designer, Barnes & Reinecke; "Evaluating the Moldable Plastics—With New and Interesting Data" by Gordon Brown, Sales Manager, Bakelite Corp.; "New Vinyl Plastics for Injection Molding" by George Miller, Sales Manager, Vinylite Div., Carbide and Carbon Chemicals Corp.; "What's New in Shop Practice" by W. J. Malcolmson, Engineer, Molding Material Department, Western Electric Co. October 23, 1940: *Current Trends in Protective Coatings*, Chairman, Dr. J. S. Long, Chemical Director, Devoe & Raynolds, Inc.; "Modern Surface Protection—Recent Case Histories of Important Coating Problems" by Dr. R. J. Moore, Manager, Sales Development, Bakelite Corp.; "How an Engineer Specifies Protective Coatings" by Charles H. Ellaby, Senior Civil Engineer, U. S. Engineer Dept.; "New Coatings Formulated with Vinyl Resins" by Howard S. Bunn, Manager, Vinylite Div., Carbide and Carbon Chemicals Corp. The meetings will be held in the lecture auditorium of the Museum. Admittance will be by invitation only and tickets may be obtained upon request through the Museum of Science and Industry, Chicago, or Bakelite Corporation.

● WESTERN CANADA PLASTIC CO. (IMPORTING), 2832 Granville St., Vancouver, B.C., has been organized in western Canada as a distributing medium for material manufacturers, fabricators, molders and laminators of every type of plastic parts and products it is announced. The plan of the company, it is said, is to lay the groundwork for the marketing of plastics in that section of Canada.

● IRVING WALKER HAS BEEN ELECTED PRESIDENT of the Metaplast Corp., 244 Fifth Ave., New York City, at their board meeting Sept. 24, 1940, the company reports.

(*Please turn to page 170*)



RIDDELL'S NEW
FOOTBALL HELMET

UARCO REGISTER SHELL

SINKO WINS *TWICE!*

The 1940 Modern Plastics Competition has placed the laurel on TWO SINKO PRODUCTS. . . Riddell's new Football Helmet is the first ever made of plastics! Injection molded, on a speedy production basis, this remarkable product is cooler, more comfortable, lighter in weight, longer lived, more shock resisting and *costs about 1/3 less* than the average quality helmet!

The UARCO Shell . . . top award winner . . . is one of the largest units in the history of injection molding. Highly complicated, it represents a successful combination of metal reinforced thermoplastics designed and engineered with almost incredible skill and precision. These two awards are impressive evidence of SINKO ability to successfully adapt injection molding to many products or parts heretofore considered impossible to produce by this speedy, economical method. Submit your molding problems to our nearest office. No obligation.

Sinko

PRECISION INJECTION MOLDING

SINKO TOOL AND MANUFACTURING COMPANY

351 NORTH CRAWFORD AVE., CHICAGO, ILL

621 NO. NOBLE STREET, INDIANAPOLIS • 6520 CASS AVENUE, DETROIT • POTTER & DUGAN, INC., 29 WILKESON STREET, BUFFALO, NEW YORK

Plastics in Ecuador

This is the third of a series of surveys issued April 1940 on South American trade in organic plastics being undertaken by the Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce, to aid United States manufacturers secure orders for such products and for machinery used in fabrication. Other articles in this series have appeared in our May and June issues. This report was supervised by Phillip K. Tattersall, Guayaquil. (Editor)

ECUADOR is primarily an agricultural country with vast forests of valuable timber as well as other forest products and large uncultivated areas suitable for agriculture thus offering almost unlimited opportunities for development.

Industrial progress is still in its infancy and although there are a small number of major industries, the majority of enterprises are comparatively small factories or home industries. With few exceptions the industries are unable to obtain their basic raw materials or machinery from domestic sources and therefore must import their requirements.

There are about 2,533,000 inhabitants of Ecuador but the standard of living and the purchasing power of the masses is low, consequently the demand for imported finished manufactured articles and such commodities not classified as primary necessities, is rather limited. Sales are confined to approximately 20 percent of the population who are financially able to purchase imported merchandise.

Production—The chemical industries in Ecuador consist of local laboratories which are engaged chiefly in the manufacture of pharmaceutical supplies and specialties, including cosmetics. Industrial chemicals are not domestically produced.

There are no concerns using plastics either semi-processed or finished, and so far as can be ascertained there are at present no projects for the establishment of plastic industries. This report, therefore, is confined to market possibilities of manufactured plastics items.

Demand and Competition—Since the official Ecuadoran customs statistics segregate only purely plastic products such as celluloid, pyrolin, bakelite, etc., and in addition include many of these articles in one unclassified group, it is impossible to obtain accurate figures on the imports of plastics, including those commodities which are partly plastic and combined with other materials.

The following import statistics for the year 1937 are the latest obtainable figures:

Class and Country of Origin	Kilograms	Value in Sucres
Plastic articles not specified in other tariff paragraphs (celluloid, pyrolin, bakelite, catalin, etc., manufactured articles):		
United States	657	24,475
Germany	1,048	46,921
Japan	139	5,715
All others	240	10,872
Total	2,084	87,983
Buttons:		
United States	316	14,453
Germany	709	22,312
Netherlands	163	2,309
Italy	126	5,218
All others	61	5,036
Total	1,375	49,328
Celluloid Collars: Germany	6	23
Phonograph records and similar types, except for the study of foreign languages:		
United States	23,580	87,553
All others	5,749	22,693
Total	29,329	110,246
Phonograph records, etc., for teaching foreign languages:		
United States	28	957
All others	9	40
Total	37	997
Phonograph records, etc., blanks for sound production:		
United States	23	500
Germany	14	560
Total	37	1,060
Combs and hair ornaments in general without jewelry or imitation jewelry or combined with metals or other materials:		
United States	146	2,661
Germany	1,118	27,615
Japan	1,175	15,458
All others	417	9,866
Total	2,856	55,600
Combs and hair ornaments in general not containing precious stones or metals:		
Japan	466	11,606
All others	8	212
Total	474	11,818
Comb and hair ornaments in general with precious stones or metals:		
France	....	68
Toys:		
United States	164	4,640
Germany	2,169	24,272
Japan	604	7,319
All others	46	867
Total	2,983	37,098

NOTE: The 1937 rate of exchange for custom-house and statistical purposes was 10.99 sucres to the dollar.

The total value of plastic articles specified as such in the Ecuadoran custom-house statistics for 1937 amounted to 354,221 sucres or $32,231. Approximately 500,000 sucres, or $45,495, is estimated to represent household articles, electrical supplies, telephones, batteries and other merchandise made of plastics or combined with other materials and not classified as such in the tariff. The total market for plastic articles amounted to approximately 854,221 sucres, or $77,726.

During the past few years, imports of plastic articles have appreciably increased, especially household goods, novelties, electrical supplies, radios, and various other commodities. It is believed, therefore, that the 1938 and 1939 imports are at least 25 percent above the 1937 figures. The outlook for 1940 indicates a further increase, particularly for the United States, as Germany, one of the principal competitors, is practically out of the market due to the present war. (*Please turn to page 176*)

Headquarters for Plastic Pulls, Knobs and Handles

WRITE for the new bulletin K-100 that shows all the latest styles, colors, and specifications on pulls, knobs, and handles for kitchen cabinets, steel cabinets, stoves, closets and drawers, furniture, desks, sewing machines, air conditioning apparatus, and many other types of equipment.

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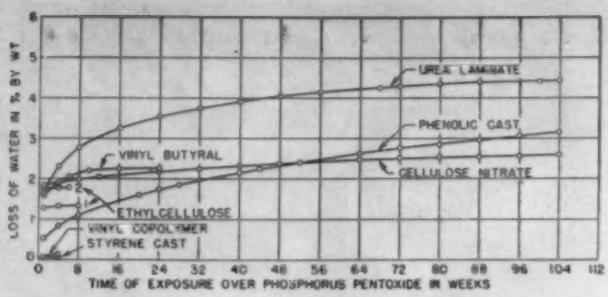
SORPTION OF WATER BY PLASTICS

(*Continued from page 123*) would be somewhat less than the values reported above for a 48-hour period.

The curves in Fig. 1 reveal the marked differences in the amounts of moisture absorbed by the various plastics and the rates at which equilibrium conditions are approached by plastics immersed in water. The almost negligible amounts of moisture absorbed by styrene and vinyl chloride-acetate resins stand in sharp contrast to the avid affinity of the protein plastic for water. The curves show that some of the plastics had not yet reached equilibrium after two years' immersion. The fourth specimen listed in Table VI for each plastic, that is, the specimen conditioned by exposure to 90 percent relative humidity at 50 deg. C. for 48 hours followed by drying in an oven at 50 deg. C. for 48 hours, was used for the long-time immersion tests. The net gain in weight for the 2-year period or the equilibrium states can be calculated from the data given in Table VI and Fig. 1.

Desorption of water over long periods

Data on the desorption of water by plastics upon long continued exposure over phosphorus pentoxide are presented in Table VII and Fig. 2. The rates at which the equilibrium values are attained during exposure over phosphorus pentoxide and during immersion in water are quite different. Many of the plastics which had reached the equilibrium state in water or over phosphorus pentoxide prior to the 2-year limit


LOSS OF WATER IN % BY WT
UREA LAMINATE
PHENOLIC CAST
VINYL BUTYRAL
CELLULOSE NITRATE
ETHYLCELLULOSE
VINYL COPOLYMER
STYRENE CAST
0 8 16 24 32 40 48 56 64 72 80 88 96 104 112
TIME OF EXPOSURE OVER PHOSPHORUS PENTOXIDE IN WEEKS

2—Desorption of water by plastics. Data for this chart are given in Table VII (below) and Table VIII on next page

were still changing in weight at the end of this period when exposed over phosphorus pentoxide or in water, respectively. The data in Table VIII on the changes in weight of the specimens during storage indicate that the continuous loss in weight of the cellulose nitrate and cast phenolic resin over phosphorus pentoxide, shown in Fig. 2, can be attributed in part to loss of volatile matter other than water.

The curves in Fig. 2 are for the specimens which had been initially dried at 50 deg. C. for 48 hours and subsequently treated as shown in Table VII and Fig. 2. The net losses in weight over phosphorus pentoxide can be calculated from the data given in Table VII and Fig. 2. The sum of the net loss when exposed over phosphorus pentoxide and net gain when immersed in water will indicate the total moisture-retaining ca-

TABLE VII.—MOISTURE DESORPTION BY PLASTICS

Material	Gain in 48 hr. at 25° C., 50% R.H., %	Loss in 48 hr. at 50° C., %	Gain in 48 hr. in water at 25° C., %	Loss in 24 hr. at 25° C., 50% R. H., %	Loss over P_2O_5, %[a] 24 hr.	48 hr.	7 days	8 weeks	Net loss in weight, %
Phenol-formaldehyde cast	−0.04	..	...	..	0.10	...	0.30	0.94	0.98
Phenol-formaldehyde cast	..	0.50	0.37	0.12	0.30	0.37	0.54	1.12	1.25
Phenol-formaldehyde laminated	0.05	..	...	..	0.13	0.21	0.37	0.86	0.81
Urea-formaldehyde laminated	..	0.65	1.00	0.33	0.90	1.08	1.53	2.78	2.43
Vinyl chloride-acetate resin	0.01	..	...	..	0.04	0.05	0.09	0.11	0.10
Vinyl chloride-acetate resin	..	0.04	0.08	0.03	0.06	0.08	0.10	0.11	0.07
Vinyl butyral resin	0.04	..	...	..	0.38	...	0.90	1.58	1.54
Vinyl butyral resin	..	0.78	1.42	0.58[b]	1.04	1.19	1.60	2.20	1.56
Methyl methacrylate resin	0.04	..	...	..	0.19	0.25	0.43	0.60	0.56
Styrene resin cast	0.00	..	...	..	0.04	...	0.04	0.04	0.04
Styrene resin cast	..	0.02	0.06	0.03[b]	0.07	0.08	0.08	0.08	0.04
Cellulose nitrate	−0.12	..	...	..	0.54	...	1.08	1.30	1.42
Cellulose nitrate	..	0.93	1.41	0.43	1.09	1.34	1.77	2.00	1.52
Cellulose acetate	0.24	..	...	..	0.76	1.16	1.56	1.75	1.51
Ethylcellulose No. 1	0.13	..	...	..	0.52	0.60	0.72	0.74	0.61
Ethylcellulose No. 1	..	0.44	1.15	0.39	0.85	1.02	1.29	1.34	0.63
Ethylcellulose No. 2	0.04	..	...	..	0.38	...	0.90	1.58	1.54
Ethylcellulose No. 2	..	0.53	1.46	0.69[b]	1.30	1.51	1.76	1.79	(0.86)
Casein	0.18	..	...	..	0.99	1.48	2.56	5.34	5.16
Casein	..	1.77	13.34	8.05	10.54	11.44	13.18	16.70	5.13

[a] The figures for percentage loss in weight over P_2O_5 include the percentage loss in weight at 25 deg. C. and 50 percent relative humidity shown in column 5.

[b] Loss in 48 hr. at 25 deg. C. and 50 percent relative humidity.

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TABLE VIII.—DIMENSIONAL CHANGES OF PLASTICS UNDER VARIOUS CONDITIONS AND WEIGHT CHANGES DURING STORAGE

Material	Dimensional change after immersion in water, %					Dimensional change after drying over P_2O_5, %			Changes after storage at 25° C. and 50 percent relative humidity, %				
	Length[a] ±0.03		Thickness ±0.8			Length[a] ±0.03		Thickness ±0.8	Length[a] ±0.03		Thickness ±0.8		Weight
	48 hr.	8 weeks	48 hr.	8 weeks	2 yr.	8 weeks	2 yr.	8 weeks	8 weeks	2 yr.	48 hr.	2 yr.	8 weeks 2 yr.
Phenol-formaldehyde molded	0.05	0.65	0.8	3.2	3.2	−0.18	−0.83	0.0	...	...	...	...	... ...
Phenol-formaldehyde cast	0.07	0.36	0.3	1.6	3.9	−0.18	−0.83	0.0	−0.8	...	...	...	... ...
Phenol-formaldehyde laminated	0.60	0.16	0.5	2.2	9.0	−0.07	−0.03	0.0	0.0	0.03	−0.26	0.0	−0.14 −0.62
Urea-formaldehyde molded	0.12	1.15	−0.8	4.8	2.3	...	...	...	...	0.03	0.07	0.0	0.8 0.25 0.65
Urea-formaldehyde laminated	0.03	0.26	0.8	3.1	3.0	...	−0.33	...	− 1.5	0.00	0.00	0.8	1.6 0.09 0.13
Vinyl chloride-acetate resin	−0.02	0.13	−0.4	0.0	0.8	−0.07	...	0.0	...	−0.07	−0.07	0.0	0.0 0.01 0.00
Vinyl butyral resin	0.07	0.89	0.8	3.3	4.1	−0.36	...	−0.4	...	...	−0.03	...	0.8 0.13 0.19
Methyl methacrylate resin	0.12	0.40	0.0	0.7	0.0	...	...	...	...	0.03	0.03	0.0	0.0 0.04 0.02
Styrene resin molded	−0.13	−0.25	−0.8	0.0	...	0.00	...	−0.3	...	0.00	0.00	0.0	... ...
Styrene resin cast	0.02	0.07	−0.4	0.0	−0.6	−0.36	−0.80	−1.2	0.0	0.07	1.29	0.0	0.0 0.00 0.00
Cellulose nitrate	0.35	0.30	0.6	0.8	0.8	−0.56	−2.09	0.0	− 0.8	0.00	0.00	0.0	−1.6 −0.36 −1.23
Cellulose acetate	0.71	0.40	0.53	0.8	2.3	−0.10	...	0.0	...	−0.03	−0.07	0.0	−2.3 −0.22 ...
Ethylcellulose No. 1	0.08	0.50	0.89	0.3	1.6	−0.15	...	0.0	...	...	...	0.0	0.0 0.14 0.27
Ethylcellulose No. 2	0.16	0.66	1.16	0.2	1.2	...	...	...	...	...	...	0.0	−0.6 0.12 0.09
Cold-molded phenolic	−0.12	0.15	0.76	−0.3	0.0	...	...	...	...	...	...	...	... ...
Cold-molded bituminous	−0.08	0.35	1.21	−0.3	0.8	...	...	...	...	...	...	...	... ...
Casein	1.98	13.24	[b]	10.2	14.4	−1.58	−4.48	−2.2	−12.9	...	−1.54	...	4.9 0.26 0.74

[a] Diameter for molded specimens.
[b] Disintegrated after immersion for 44 weeks.

pacity of any particular plastic under the conditions established under these tests.

Dimensional changes over long periods

The expansions or contractions caused by changes in the moisture contents of the plastics are shown in Table VIII. The extent of the dimensional changes correlates well with the hygroscopicity of the plastic. Casein, which absorbs more moisture than any other plastic investigated, also shows the greatest changes in dimensions and the hydrophobic materials, polystyrene and vinyl copolymers, show the least variation in dimensions under the different conditions.

Acknowledgment

The authors express their appreciation to Messrs. W. J. Clarke, C. A. Nash, and G. H. Mains, co-members of the Section on Water Absorption, which prepared the A.S.T.M. tentative method for measuring the absorption of water by plastics, for their interest and suggestions during the course of this investigation.

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A.S.T.M. test for absorption

(*Continued from page 128*)

(*a*) Specimens of materials whose water absorption value would be appreciably affected by temperatures in the neighborhood of 110 deg. C., shall be dried in an oven for 24 hours at 50 ± 3 deg. C., cooled in a desiccator, and immediately reweighed.

NOTE.—If a static charge interferes with the weighing, lightly rub the surface of the specimens with a grounded conductor.

(*b*) Specimens of materials, such as phenolic laminated plastics and other products whose water absorption value has been shown not to be appreciably affected by temperatures up to 110 deg. C., shall be dried in an oven for 1 hour at 105 to 110 deg. C.

(*c*) When data for comparison with absorption values for other plastics are desired, the specimens shall be conditioned in accordance with Paragraph (*a*).

(*Please turn to next page*)

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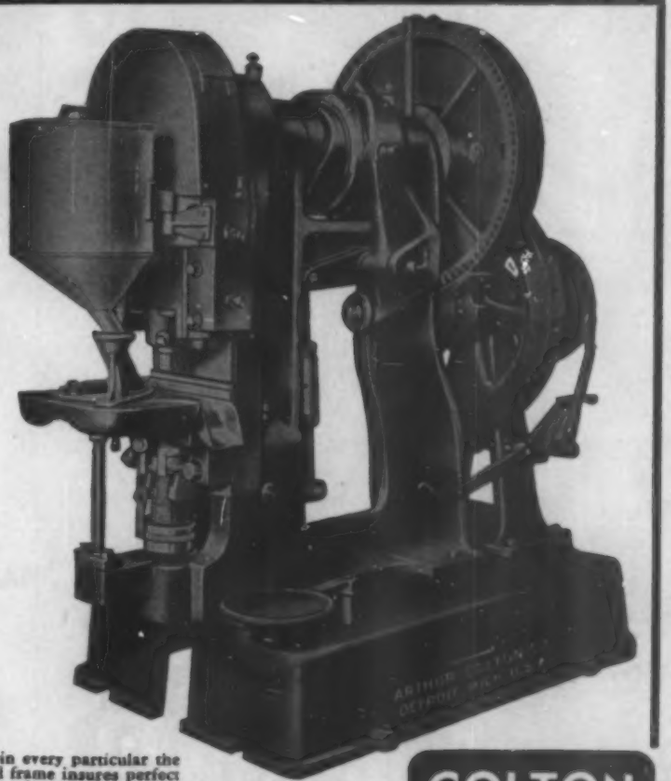

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Procedure

5. (*a*) *24-Hour Immersion.*—The conditioned specimens shall be placed in a container of distilled water maintained at a temperature of 25 ± 2 deg. C., and shall rest on edge and be entirely immersed. At the end of 24 hours, the specimens shall be removed from the water one at a time, all surface water wiped off with a dry cloth, and weighed immediately. If the specimen is 1/10 in. or less in thickness, it shall be put in a weighing bottle immediately after wiping and weighed in the bottle.

(*b*) *2-Hour Immersion.*—For all thicknesses of materials having a relatively high rate of absorption, and for thin specimens of other materials which may show a significant value in 2 hours, the specimens shall be tested as described in Paragraph (*a*) except that the time of immersion shall be reduced to 2 hours.

(*c*) *Repeated Immersion.*—A specimen may be weighed after 2-hour immersion, replaced in the water, and weighed again after 24 hours.

NOTE.—In using this method the amount of water absorbed in 24 hours is likely to be less than it would have been had the immersion not been interrupted.

(*d*) When data for comparison with absorption values for other plastics are desired, the 24-hour immersion procedure described in Paragraph (*a*) shall be used.

Reconditioning

6. When materials are known or suspected to contain any appreciable amount of water-soluble ingredients, the specimens after immersion shall be reconditioned for the same time and temperature as used in the original drying period. They shall then be cooled in a desiccator and immediately reweighed. If the reconditioned weight is lower than the conditioned weight, the difference shall be considered as water-soluble matter lost during the immersion test. For such materials, the water-absorption value shall be taken as the sum of the increase in weight on immersion and of the weight of the water-soluble matter.

Calculation and report

7. The report shall include the values for each specimen and the average for the three specimens as follows:

(1) Dimensions of the specimens before test, measured in accordance with Section 3 (*f*), and reported to the nearest 0.001 inch,

(2) Percentage loss in weight on initial drying, calculated on the basis of the original weight, and the conditioning time and temperature,

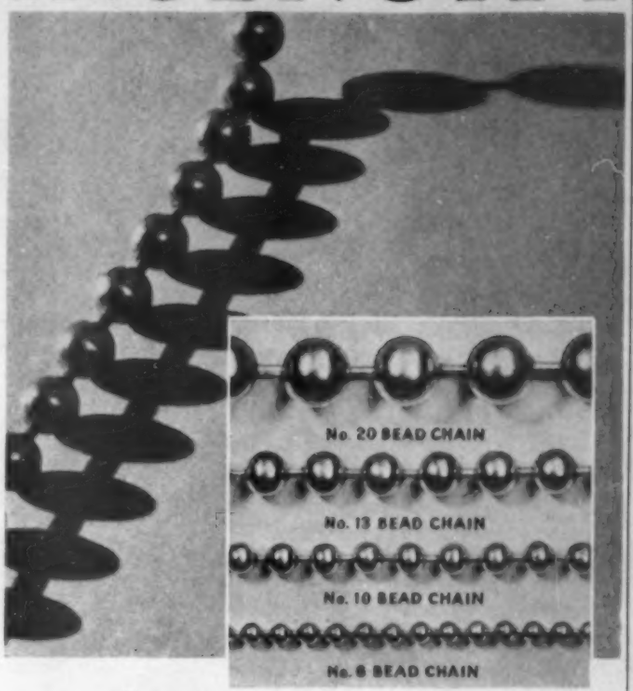
(3) The time of immersion,

(4) The percentage increase in weight during immersion calculated to nearest 0.01 percent as follows:

$$\text{Increase in weight, percent} = \frac{\text{wet wt.} - \text{conditioned wt.}}{\text{conditioned wt.}} \times 100$$

(*Please turn to next page*)

INGENUITY



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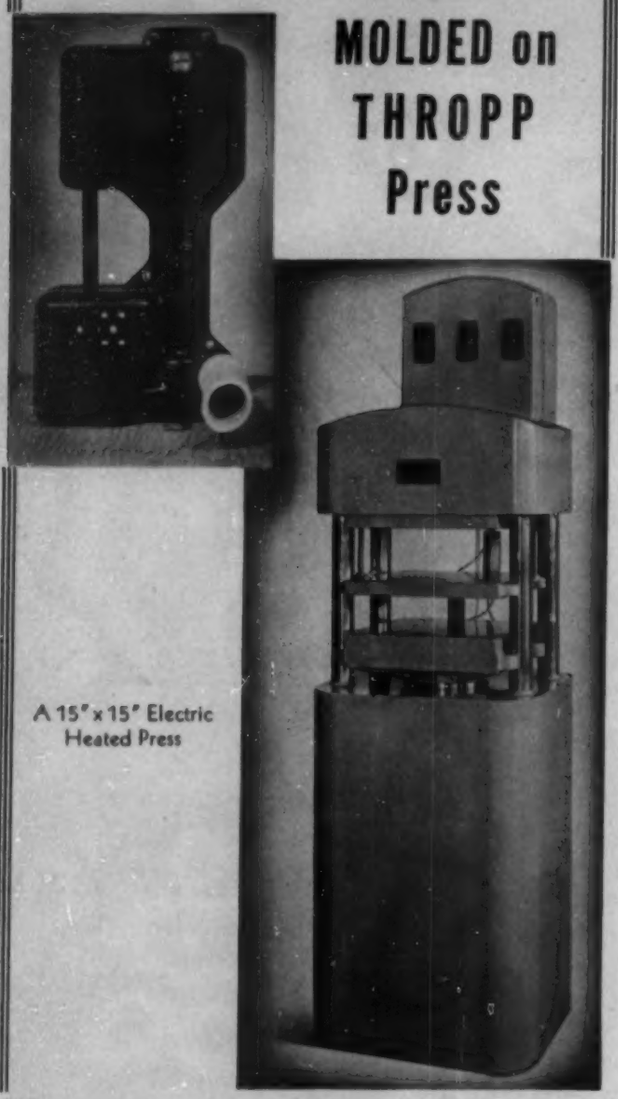

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(5) The percentage of soluble matter lost during immersion, if determined, calculated to nearest 0.01 percent as follows (Note):
Soluble matter lost, percent

$$= \frac{\text{conditioned wt.} - \text{reconditioned wt.}}{\text{conditioned wt.}} \times 100$$

NOTE.—When the weight on reconditioning the specimen after immersion in water exceeds the conditioned weight prior to immersion, report "none" under item (5).

(6) The percentage of water absorbed in 24 hours (or in 2 hours), which is the sum of the values in items (4) and (5), and

(7) Any observations as to warping, cracking, change in appearance of the specimens.

Plastics versus corrosion

(*Continued from page 125*) on concrete floors around acid pumps and plating tanks show that it stands up under actual working conditions. In sanitary sewers it has in some cases withstood the attack of acid, gases and condensation, bacteria, and 100 percent humidity for several years. In other cases, after long exposure, the coating has become blistered although never disintegrated. Present redesign of the product bids fair to see it ultimately withstand the ravages of all sanitary sewer exposures.

There have been several tests made for the mining industry. The most extensive was for dilute copper sulfate and sulfuric acid solutions. The exact percentage of these ingredients varies with different mine waters. However, the test solution was made up of 2 percent copper sulfate, 1 percent ferrous sulfate, 1 percent ferric sulfate, and $^1/_2$ percent sulfuric acid. This corresponded closely to the mine water from which the copper was being precipitated. The tests on this coating under these conditions were conducted for 90 days without any sign of breakdown. These tests being satisfactory, it has been selected by a large copper mining company as a lining for large drum filters which are exposed to the mine water. Other tests have been successfully made in electrolytic zinc baths containing zinc sulfate and sulfuric acid and in borax tanks.

The maritime industry has long had some of the most serious conditions in the corrosion field. In two cases at least these resins have relieved if not solved their problem. One is the fuel and fish storage tanks on the tuna clippers. These tanks are alternately filled with fuel oil on the trip out to the fishing grounds, and with refrigerated salt brine and fish on the way back. The combination of alternating exposure to fuel oil, salt brine, fish oils, freezing temperatures, and the abrasion caused by the rubbing of the fish, creates a severe condition for any protective coating. That it must be non-contaminating to the fish is paramount. This product has been installed in several of these boats for

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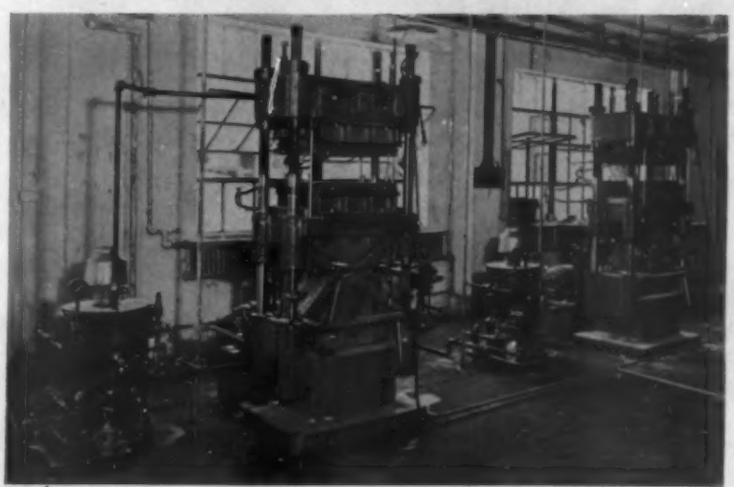

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Recently installed in the plant of a prominent plastic manufacturer, these 2 hp type SAX Kane boilers supply steam to 150 ton Stokes presses having a maximum platen area of 26 by 24 inches, for the production of buttons. 80 lb. pressure is maintained when "Urea" compositions are molded, 120 to 135 lb. pressures for molding "Phenol" compounds.

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two years and in many for over one year. These installations have, in all ways, given a good account of themselves, according to recent reports.

Another condition is that of the boot-topping strip on the fast ocean vessels. This area, about 10 ft. wide, to provide for loaded or light depths, is the area at the water line where the surface is constantly being wetted and dried, and where wind and the wave water and physical abrasion are the greatest. This abrasion is a large factor in the life of a coating applied in this area, and any coating so applied must protect the steel against the action of salt water, wind, and salt spray, have tenacious adhesion, and have a high resistance to this abrasion. This coating on a boot-topping panel in a preliminary test, made a distinctly impressive record, among the other well-known resistant coverings, and after six months' service was rated as excellent by shipping authorities. It is now being further tested as a complete boot-topping on some of the large trans-Pacific liners.

The diversity of the above successful uses of this coating material, from lining food containers to protecting ships' hulls, only goes to show again the great versatility which can be obtained from the newest of chemical products, modern plastics.

A letter from London

(*Continued from page 114*) These crosses are all to be molded of phenolic and the first installment of 50,000 has already been distributed. Measuring 2 in. in length and 1½ in. across, with a little ring on the top so that it can be suspended from a cha'n round the neck, the crucifix shows on one side the figure of our Lord sunk into the cross in order that it cannot catch in the wearer's uniform. This order for 2¼ million crosses is considered by the trade to be quite a nice run!

A project which may possibly develop is now being considered by one of Britain's leading cigaret manufacturers. It consists of a molded outer covering to replace the ordinary printed carton of the cigaret packet. The idea, at this stage, is to issue say a million or so of the moldings to customers who would retain them permanently. On re-purchase of cigarets they would merely hand over the molded outer covering to the tobacconist, who would slide in the inner carton containing the cigarets. This scheme would, it is claimed, render possible the economy of a large bulk of paper. Unfortunately there are several snags. First, the molding, if of phenolic or urea material, would be difficult to print so as to obtain an exact replica of the carton, and apparently this is essential and, secondly, it might be too fragile for permanent use and, by permanent, one assumes a life of 6 to 12 months. Probably the greatest difficulty would be to execute such an order at this time when most molders are working to capacity. Cellulose acetate is, of course, the most suitable mate-

PLASTIC INSERTS on a PLASTIC MOLDING!

This attractive nameplate goes through two integrated molding processes before the finished result is achieved. First the upright sections are molded, in either red or green. Then these sections are placed in another mold in which the ivory letters are molded in interlocking fashion, forming an integral unit with the upright.

This nameplate represents a real achievement in mold design. The molds were worked out so that a perfect lock was achieved with pieces molded entirely separately. The entire job is injection molded, the upright stem being molded with depressions to receive the letters molded around and with it.

Projecting lugs are also integrally molded to the upright, allowing of fastening to a stoker. Double-injection, the process by which this piece is molded, is only one of the unique molding methods for handling modern plastics evolved by the Gits Corporation. Our flexible, modern, capable plant and organization are at your service to fill your plastic needs.

Photograph Courtesy Tennessee Eastman Corp.

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PORTER-CABLE Wet & Dry Grinders with flat back-plate also available in various sizes.

HERE'S a New method that insures production speed-up for your plastic finishing . . . often 5 times faster . . . always better than hand work! You can depend on this PORTER-CABLE Wet-Belt Grinder to stop plastic flow . . . heating . . . chipping . . . discoloring . . . fracturing and warping. Spoilage reduced to a minimum!

There's a reason for faster, smoother work . . . the *flexible* and *tough* Wet-Belt. PORTER-CABLE Grinder gives you cleaner, high-speed cutting on either straight, concave or convex surfaces—washes "fill-up" from abrasive belt—makes big economies over ordinary belt or disc practice. Grinds uniformly—straight grain, no waves. Eliminates dust hazard. Easy to operate. Write us TODAY about *your* finish problems. Send samples now. Let us help you get better finish at lower cost!

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Once again an important radio company picks ATTLEBORO to produce the plastic molded housings for their sets.

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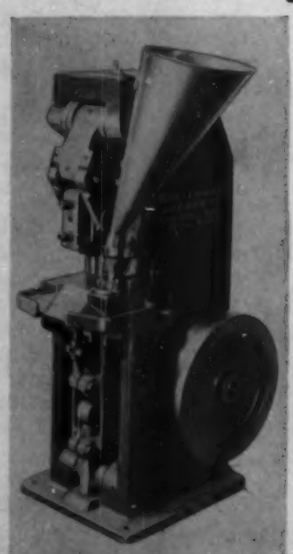

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rial, but at something like 3s.6d. a pound [approximately 72 cents] this would probably be considered highly uneconomical.

Incidentally, the introduction of food rationing has helped the plastics industry, although at first sight it might appear that the connection is somewhat obscure. Already specially molded bowls are in use in Lyons teashops to hold the ration of sugar, which would otherwise be completely lost in the ordinary sugar bowl and looks unappetising when served up in tiny paper cups. These "ration" bowls are molded of white urea and look quite attractive. Other well known caterers are reported to be interested in similar types of moldings.

As soon as the news of France's collapse became known it was realised that the cessation of supplies of Rhodoid, made by Rhone-Poulenc, would be serious and that greater reliance would have to be placed on imports from the United States. Immediate steps were, however, taken in Great Britain to increase the home production of acetate sheet and powder and it was announced at the end of July that May and Baker Ltd., who previously handled the sale in Great Britain of Rhodoid, will be in full production of acetate in three months' time. The firm of May and Baker Ltd. is said to be one of the largest manufacturers of pharmaceutical chemicals in the country and to possess the organization necessary to make such a project a success. Meanwhile, however, there is a growing demand for acetate sheeting from America and nitrate is also reported to be imported in considerable quantities.

At the beginning of the war some interest was taken by the War Department in the molded helmet, but apparently it was condemned as the result of tests carried out. News just reaches your correspondent, however, that the British Ministry of Supply is now interesting itself in the idea for non-military purposes, particulars of which are at present lacking. As the menace of air raids grows more intense, the needs of all branches of the civil defense organizations become more pressing and there is no doubt that molded helmets would be very useful to those workers not entitled to an issue of the standard steel helmet.

July 24, 1940

John S. Trevor

Ed. Note—This is the fourth of a series of London Letters describing the effect of the European war on the British Plastics Industry. We are printing below because of its present day interest, a letter received from Britain commenting on Mr. Trevor's communication published in our July, 1940 issue, page 42.

28 Albany Street,
Hull, Yorkshire, England.
1st August, 1940.

Editor, Modern Plastics:

The sentiments expressed by the writer of "A London Letter" would be most praiseworthy and truly representative of the view of the "People of England" if he had refrained from voicing his fear of air raids.

We in this country believe, and events of the last month strongly support our faith that mass raids on this island will be

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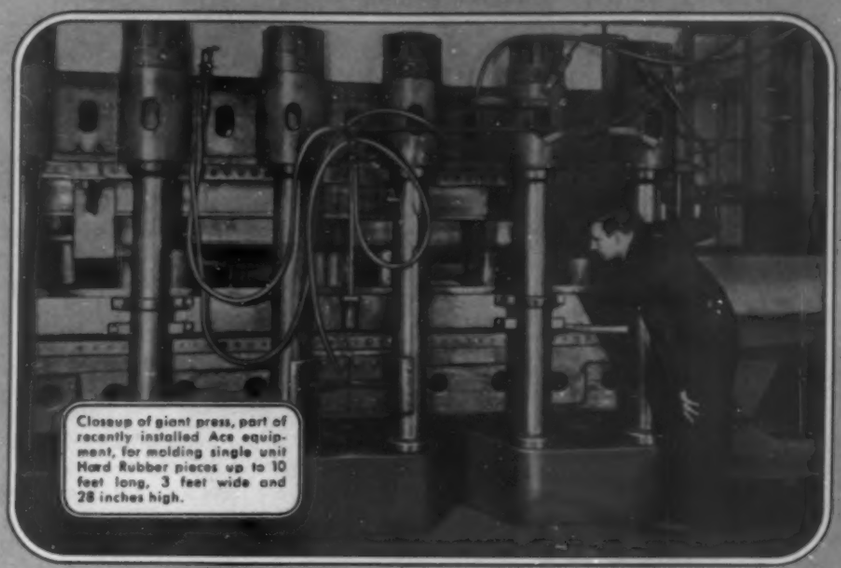

Closeup of giant press, part of recently installed Ace equipment, for molding single unit Hard Rubber pieces up to 10 feet long, 3 feet wide and 28 inches high.

GIANT one-piece moldings in Hard Rubber are now available for industrial uses. Ace has made this possible through new molding techniques, ingenious equipment. Ace engineering, design and laboratory staffs are prepared to plan and produce Hard Rubber articles of unusually large size.

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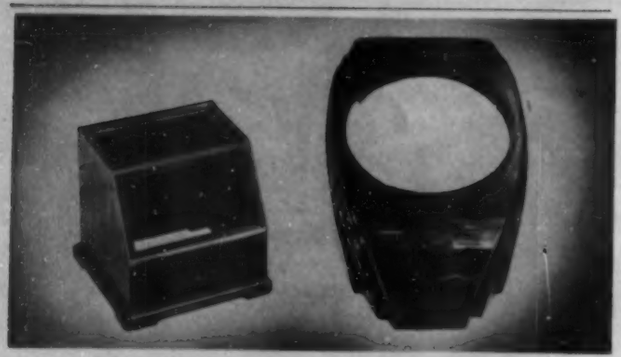

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costly to the attacker, and the results achieved by them will be of small material or moral value.

One is moved to make this protest, because it seems to the writer after a careful study of articles in the New York and Chicago Press, and after reading reports in English papers of the speeches of leading U. S. citizens, that the idea is gaining ground in the United States that the position in this island is not merely grave, which it certainly is, but that it is utterly hopeless, which is emphatically not true.

Yours, etc.,
Edward H. E. Sargend

Plastics at the A.C.S. meeting

(*Continued from page 130*) to methylene groups. These reactions are very slow and seem to proceed approximately in accordance with a zero order rate law. The condensation rates are in the order: 3,5-xylenol > *meta*-cresol > saligenn > phenol > 2,3,5-trimethyl phenol > *ortho*- and *para*-cresol > 2, 6, - methyl phenol. The effect of variations in various factors was discussed, and a means of estimating the chain length of phenolic resins was given.

CRYSTALLINE BEHAVIOR OF LINEAR POLYAMIDES. EFFECT OF HEAT TREATMENT ON CRYSTALLINITY. C. S. Fuller, W. O. Baker and N. R. Pape.

Many natural and synthetic long-chain polymers are characterized by a high degree of crystallinity in the sense that they are capable of providing sharp x-ray reflections. Recent investigations support the view that in such substances portions of the linear molecules are united into crystalline aggregates which give rise to these reflections, whereas other portions of the molecules exist in amorphous or pseudocrystalline groupings. The present study was undertaken to secure more information on the nature of these crystalline regions and on their relationship to the less well-ordered components in the long-chain polymers. Polyamides produced through the condensation of diamines with dibasic acids were chosen as suitable compounds for this investigation. Samples of polyhexamethylene sebacamide and polyhexamethylene adipamide having intrinsic viscosities in cresol of 1.021 and 0.974, respectively, were melted under hydrogen and subjected to standard chilling procedures. X-ray photographs were taken of these specimens and the central portions of each photograph were photometered. Samples quenched at 20 deg. C. were also examined after various annealing times at 200 deg. C. in hydrogen. In another series of experiments oriented fibers drawn from polyhexamethylene sebacamide quenched at 25 deg. C. previous to their drawing were examined by x-rays after various annealing times at 200 deg. C. In order to show the corresponding physical effects of the various quenching procedures, Young's modulus was determined on the samples of the first series of experiments.

The samples quenched at 20 deg. C. show essentially a single spacing corresponding to a common interchain distance. This suggests that a large proportion of the chains are arrested by the rapid cooling so as to form packets in which the chains lie parallel but are randomly rotated about their long axes. As the quenching temperature is increased, however, a progressive change in the patterns occurs indicating that the individual chain sections thereby retain sufficient thermal energy to rotate into the more stable lattice-like arrangement. Young's modulus determined on these specimens showed a progressive increase with the temperature of quenching indicating that the crystalline nature of the polymers has a profound influence on their physical properties. Samples quenched at 20 deg. C. and subsequently annealed at 200 deg. C. likewise underwent internal rearrangement with the ultimate formation of further lattice-like aggregates. Oriented fibers drawn from material quenched at 25 deg. C. when annealed at 200 deg. C. for various times also showed a gradual transition to

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Winning Top Award in the 1940 Modern Plastics Competition, this harmonica, the first entirely made in America of American materials, answers several problems.

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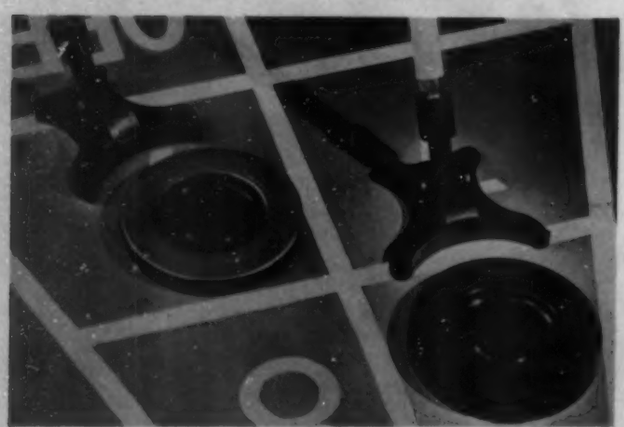
Plastic DISKS HELP BRING BACK SHUFFLE BOARD



The old game of shuffleboard which had been confined to shipboard for many years is now moving back to parks, beaches and vacation spots, also home recreation rooms. And, to a large part, this revival is attributable to the successful molding of a shuffleboard disk which eliminates splitting and breakage.

The plastic disks, molded of special material supplied by Bakelite and Durez, are not only stronger, they are livelier and more resilient in play. They may be left exposed to all the rigors of weather without noticeable warpage or other deterioration.

Winning Honorable Mention in the Plastics Competition is a fit tribute to the disks. They represent another step outward in ever-expanding plastic applications.

This development is typical of the pioneering spirit of our organization. Constantly pressing forward into new fields of achievement, we feel that we have a service to offer to plastics users that is both stimulating and effective. Try us.

DAYTON INSULATING MOLDING CO.

418 E. FIRST ST. DAYTON, OHIO

a more crystalline arrangement. The results obtained demonstrate clearly that motion involving chain segment rotation takes place in these polymers in the solid state. Furthermore, evidence is provided that the properties of toughness and flexibility in these polymers are associated with the amorphous or pseudo-crystalline components present.

SOME OBSERVATIONS ON PLASTICIZERS FOR CELLULOSE ORGANIC ESTER PLASTICS. W. E. Gloor and C. B. Gilbert.

Physical properties of plastics, prepared in the laboratory using various materials as plasticizers with cellulose acetates of 2.28 and 2.65 acetyl groups per C_6 unit, a cellulose acetate propionate and a cellulose acetate butyrate, were described. The chief factors influencing the properties of such thermoplastics are the amount of non-cellulosic material (whether chemically bonded to the chains or colloidally held) and kind of plasticizer held by the colloidal bonds. Both spatial configuration and substitution of the plasticizer are important. The structure of tough and brittle plastics was represented by diagrams.

MELAMINE-FORMALDEHYDE FILM-FORMING COMPOSITIONS. T. S. Hodgins, A. G. Hovey, S. Hewett, W. R. Barrett and C. J. Meeske.

Chemistry of Melamine Resins: Melamine (1,3,5-triamino 2,4,6-triazine), although discovered by Liebig in 1834, was mentioned by Pollak in 1922 as a possible ingredient of amine-aldehyde resins. It has only recently been found to impart to resins the practical advantages of both heat stability and low temperature convertibility. This makes the substitution of melamine for low-cost urea feasible in resins. Analogous to the formation of methylolureas, methylolmelamines are readily formed. Trimethylol- and hexamethylolmelamines have been isolated and analyzed. The subsequent etherification of the methylolmelamines by alcohols, analogous to the etherification of the methylolureas, yields, in most cases, water-white, heat-hardening resinous products characterized by their color retention and heat stability at elevated temperatures and by ease of conversion at lower bakes. The heat stability may possibly be due to the absence of the carbonyl group in melamine, which is believed to be the weakness of the ureaformaldehyde resins in this respect. The relative ease of conversion at lower temperatures might easily be expected, due to the greater number of functional points on melamine as compared to urea.

Physical Properties of Melamine Resins: Melamine resins, as compared to urea resins at the same degree of etherification, tend to be more compatible with hydrocarbon solvents, vegetable oils, plasticizers, alkyd resins and urea resins. Triaxial diagrams for the three component system, melamine resin-urea resin-alkyd resin show variations in the properties of these systems in adherence, hardness, flexibility, clarity, viscosity and color retention with time-temperature and type of alkyd as variables. Melamine resins, as compared to the corresponding urea resins, have, in general, improved resistance to water and humidity, alkali, acid, grease and solvents.

Industrial Uses: In industrial enamels, the advantages of the melamine resins are heat-resistance and rapid low-temperature conversion. For simplicity and greater control of formulations, it would seem advantageous to use concentrated melamine resins rather than to use a multiplicity of modified resins containing a relatively lower concentration of melamine. High-speed urea enamels for refrigerators, stoves, and general metal finishing are further accelerated by the use of concentrated melamine resins. These melamine resins are well adapted to "flash baking" at high temperatures and to infra-red baking. In the low baking field, melamine resins can be converted at temperatures approximately 100 deg. F. less than the already familiar urea resins, and thus approach the class of finishes called the "forced drying" type.

TOP AWARD—COMMUNICATIONS

The beautiful Philco Portable radio won Top Award in the Communications section of the 1940 All-America. Bridgeport's contribution is the molded knobs, finely formed of pastel plastic to conform with the unusual design.

Bridgeport has consistently been chosen by leading plastics users throughout the country as the molder who can do most for their product. We have a wealth of experience, aggregating in excess of 100 years, in plastics molding. Our facilities encompass both injection and compression methods—and we have modern, high-speed presses of each kind. And the latest process of all—extrusion—is available in our complete plant.

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. . . the R. D. Wood Company provides hydraulic presses in a wide variety of types and sizes. Be sure to consult Wood engineers regarding your press requirements.

(Left) This 50 ton HydroLectric precision type molding press is operated by a two-pressure rotary pump at 200 pounds low pressure and 1000 pounds high pressure.

A 30 ton HydroLectric laboratory press with variable pressure pump and loading elevator. Pressure range—2 to 30 tons.

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PLASTIC MIXING & MOLDING EQUIPMENT—Factory rebuilt—Hot Rolls or Mixing Mills, Hobbing and Die Sinking Presses, Semi-automatic and Standard Molding Presses, Hydraulic Pumps, Accumulators, Intensifiers. Reply Box 294, Modern Plastics.

WANTED: CELLULOSE ACETATE SCRAP, unground or reground, as well as lumps, also acrylic or methacrylic resin scrap and celluloid scrap. Send details concerning quantities and price. Reply Box 318, Modern Plastics.

FOR IMMEDIATE SALE: Semi-Automatic Hydraulic Presses, 1—300 Ton, 10" Ram, 30" x 25 Platens, 2500 lbs.—1—175 Ton, 18" Ram, 28" x 24" Platens, 1500 lbs.—1—250 Ton, 18" Ram, 28" x 24" Platens, 2000 lbs.—11—125 Ton, 13" Ram, 23" x 17" Platens, 2000 lbs. Large stocks Hydraulic Presses, Pumps, & Accumulators, Preform Machines, Rotary Cutters, Mixers, Grinders, Pulverizer, Tumbling Barrels, Drill Presses, Lathes, Gas Boilers, etc. Send for Bulletin #156 and #128. We also buy your surplus machinery for cash. Reply Box 378, Modern Plastics.

FOR SALE: Birm. 6" x 12" Lab. Rubber Mill, M. D.; 10—Semi-Auto. Presses, 75 to 400 ton, ejectors and pull-backs; 2—40" Mixing Rolls; 4—Gould Triplex Hydraulic Pumps, 2—1500 PSI, 35 GPM, 2—3000 PSI, 18 GPM; 2—W.S. 4-cyl. opposed Hydraulic Pumps, 6000 PSI, 25 GPM, 100 HP motor drive; W.S. Hydro-Pneumatic Accumulator, 8" ram, 48" stroke, 42" air cylinder, 5000 PSI; 3—24" x 24" Hydraulic Presses; 4" Extruder; 7—W. & P. Mixers. Send for Complete List. Reply Box 385, Modern Plastics.

POSITION WANTED: I'll trade you ambition, energy, ability; the experience of 6 mo. plant engineering in hard rubber and storage batteries, Buffalo; 6 mo. photographer, N. Y. C.; for one good position anywhere. 23 yrs old, B.Ch.E., 1939. Reply Box 392, Modern Plastics.

WANTED: A man experienced in practical commercial molding, familiar with thermoplastics. Interested and capable of aiding in process development. Reply in full detail to Box 393, Modern Plastics, stating experience, connections and salary desired. Practical man preferred.

WANTED: Small semi-automatic hydraulic press for special test purposes. Ram size between 5" and 10" in diameter; minimum die size about 12" x 16". Advise make and location. Reply Box 394, Modern Plastics.

WANTED: Sales Engineer to take charge of sales of small company about to enter injection molding. Must be experienced in obtaining customers for custom molding work, must be familiar with various materials, dies and equipment. Give past experience and references. Reply Box 395, Modern Plastics.

YOUNG CHEMICAL ENGINEER desires position with plastics firm. Received degree B.Ch.E. Cum Laude in 1940. Outstanding academic record. Thesis on plastics from lignin; experience in Lucite and Plexiglas fabrication. Salary secondary to opportunity to learn and advance. Location immaterial. Reply Box 396, Modern Plastics.

MEXICO: Desire contact with well established manufacturer small plastic articles by injection moulding who wishes extend business in Latin America and interested establish branch plant in Mexico with cooperation of Mexican capital and selling organization. Reply Mauricio Roud, P. O. Box 2586, Mexico, D. F.

Machinery and Equipment

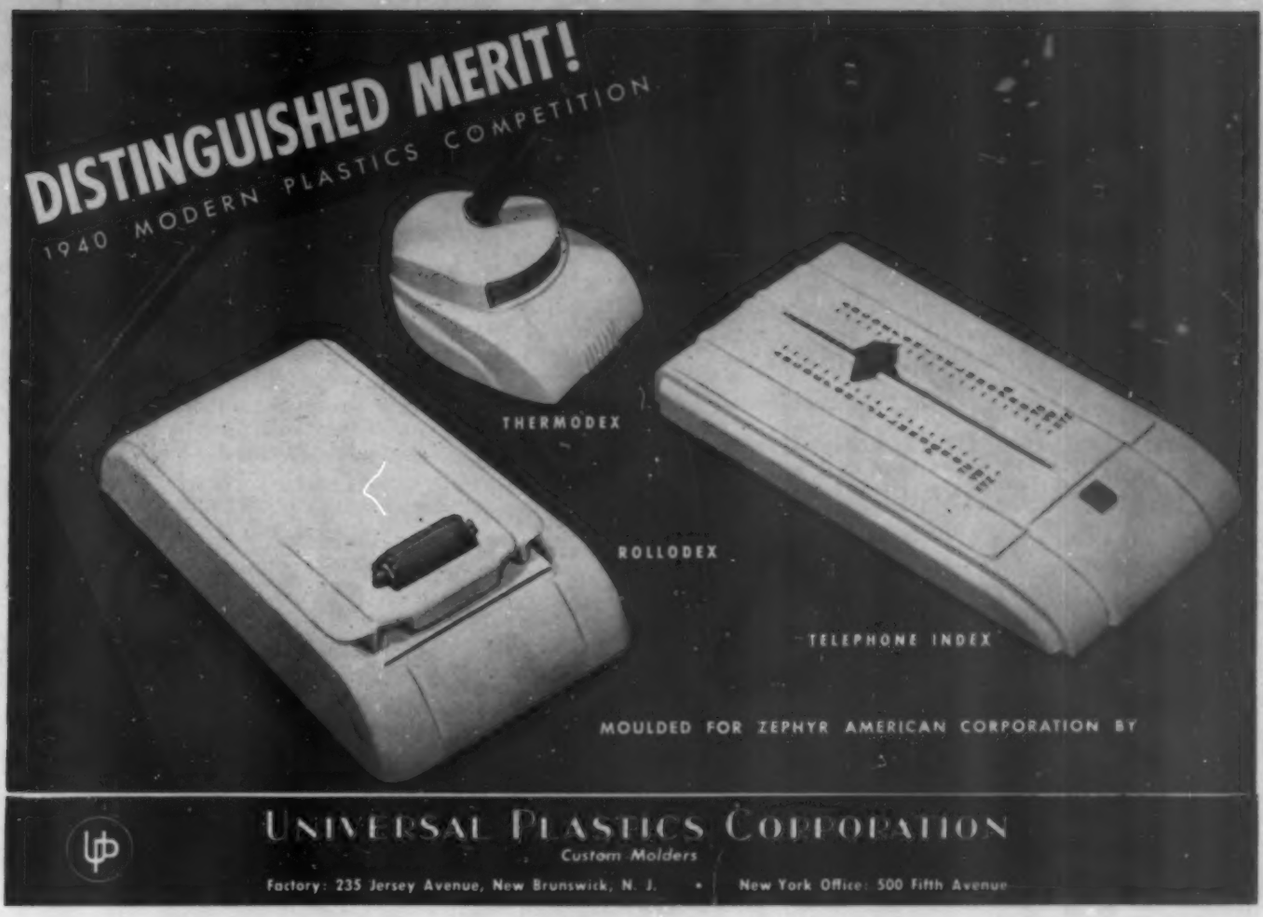
(Continued from page 144)

● DOUBLE RIBBON MIXING MACHINES, DESIGNED for fast, efficient mixing of materials ranging from dry powders to heavy viscous pastes, have been introduced by the H. K. Porter Co., Inc. Two metal ribbons, welded spirally to the inner surface of the mixing cylinder, are said to create a positive double folding action on the materials being mixed, thus assuring the user of perfectly mixed batches. The spirals are so placed that the mix is worked toward the discharge end of the cylinder, so that when mix is completed it can be removed easily. The mixer cylinder itself lies within a baffled jacket, for either heating or cooling by means of hot or cold water. Additional advantages claimed for the mixer lie in the facts that the motor is mounted on the same base as the machine itself, eliminating danger of misalignment; and that the machine is fitted with antifriction bearings and special end seals, to keep materials being mixed from the shaft. All gears and other working parts are totally enclosed, for safe operation. The machine is of 60 cu. ft. capacity, equipped with a 15 hp. 440 volt, explosion-proof motor. It is available in any capacity, from laboratory to large production sizes, and may be fitted with any type motor desired.

● A NEW ADDITION TO THE HAMMOND LINE OF rite-speed polishing and buffing lathes is the model 10-ROH illustrated above. This polishing lathe has an "overhanging" spindle, the front section overhanging 12½ in. from lower front of base and is said to be especially desirable on large bulky pieces of either plastic or metal material. Standard equipment includes spindle lock for holding spindle when changing wheels; combination switch and brake which shuts off motor and instantly stops the revolving spindle; automatic motor starter; up to 10 h. p. motor with Multi-V Belt Drive mounted inside the base.

● MOTOR-DRIVEN HYDRAULIC PUMP CAPABLE OF developing pressures up to 6000 lb. per sq. in. is announced by the American Instrument Co. It is reported to be especially applicable for use in creating high test pressures for catalytic hydrogenation work, for determining the bursting strengths of cylinders, spheres, etc., for operating high-pressure and hydraulic intensifiers, and for determining the effects of high pressures and their sudden release on various materials. It consists essentially of a geared-head motor (for operation on 115 or 230 volts A. C. or D. C.), reservoir and compression chamber, mounted on a substantial cast iron base. Theoretical displacement per hour, 553 cu. in. Working volume of the reservoir, 1300 ml.; actual volume, 3000 ml. Working and actual volumes of the compression chamber, 1300 ml. Tested to 9000 lb. per sq. inch.

For Manufacturers' addresses, write to the Editor enclosing a 3-cent stamp.



UNIVERSAL PLASTICS CORPORATION
Custom Molders
Factory: 235 Jersey Avenue, New Brunswick, N. J. • New York Office: 500 Fifth Avenue

Williams-White

***Press Molds* WINNER**

Another laurel is added to the many gathered by Williams-White presses in their 85 years of service to plastics and other fields of industry. The plastic agitator for the Barton Corporation's washing machines, molded by the Eclipse Moulded Products Company, won Honorable Mention in the 1940 Modern Plastics Competition. Builders of some of the largest presses ever made, our facilities include every size of hydraulic press for molding and laminating plastics.

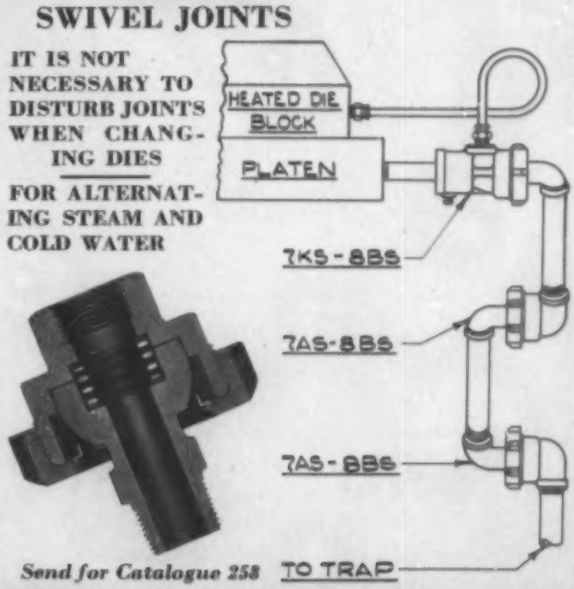
WILLIAMS-WHITE & COMPANY
MOLINE **ILLINOIS**

BARCO *REDUCE MAINTENANCE COSTS*

SWIVEL JOINTS

IT IS NOT NECESSARY TO DISTURB JOINTS WHEN CHANGING DIES

FOR ALTERNATING STEAM AND COLD WATER



Send for Catalogue 258

Barco Manufacturing Co.
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CHICAGO, ILL.
In Canada: The Holden Co., Ltd.

VAZAH INC.

Cora Scovil, President

Creators, Designers, Fabricators of Plastic Furniture and Decorative Objects

The award in Plastic Competition testifies to the competence of our craftsmanship

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1. Toys & Novelties
2. Mechanical Parts
3. Electrical Parts
4. Parts for Chemical Apparatus
5. Cosmetic Closures and Containers

They're Columbia's, too! Columbia injection molding is widely recognized for its skilled achievements in these 5 fields of production. Columbia is equipped to meet your requirements with absolute precision—whatever the type of plastic, or speed of service demanded.

COLUMBIA MOLDED PLASTICS

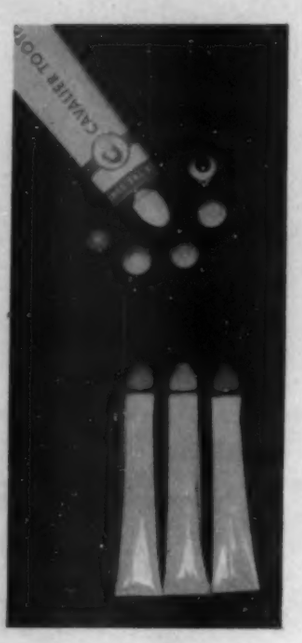
COLUMBIA PROTEKTOSITE CO., Inc., Carlstadt, N. J., U. S. A.

In the limelight

(Continued from page 148)

● J. ROBERT FISHER HAS BEEN APPOINTED MANAger of special products for the Millmaster Chemical Co., 7 W. 45th St., New York, according to R. J. Milano, sales manager.

● C. K. CASTAING, FOUR-TIME WINNER IN THE Modern Plastics Competition, will have charge of casting and fabricating instruction at Plastics Industries Technical Institute, we are informed. Another recent member of the staff of instructors at the Institute is Dr. Trickey, one-time instructor in plastics at University of Kansas and more recently engaged in custom molding on the West Coast. Day and night resident classes in the first semester began October 7th under the supervision of John Delmonte, technical director. Equipment for molding and fabricating training is rapidly being installed.



● CAVALIER CAP CORP. HAS ANNOUNCED THE development of a newly patented, non-metallic collapsible tube (shown above) available both with screw-type caps and a new, fully automatic, molded plastic closure. The tube bodies are formed of clear transparent or tinted rubber hydrochloride or vinyl sheet material and, it is claimed, may be decorated with either direct or reverse printing. Tubes will be available in crystal clear, opaque, transparent and metallic colors. At present the containers are available only in the $^1/_8$ in. diameter size equipped with automatic dispensing closures. Machinery is now in the process of manufacture, it is reported, to permit the fabrication of other sizes and constructions.

The tubes are designed to be filled on standard tube-filling machinery and may be closed either with a heat-seal crimp or a metal clip. The automatic dispensing cap is available both on the non-metallic tube and for use with conventional types of metallic collapsible tubes. In the latter case, the cap is so constructed of molded plastics as to fit over the thread of the tube in the same manner as a conventional closure is now applied. A spring device causes a plastic plug—which may be molded of contrastingly colored material—to close the cap orifice after each ejection of tube contents. When pressure is applied to the tube, this spring-held plug opens and dispenses automatically, closing automatically when pressure is removed. Further details are available from the company. *(Please turn to next page)*

A TOP AWARD

Molded Plastics Boat

The most difficult of the motor toys to construct is the model boat. Reuhl Products came to the Plastics Engineering Company for the production of the shell of this 26 inch hydroplane. The object was a colorful boat, one with real sales appeal. Simplified construction (the entire hull, except the purposely separate hatch cover, is molded in one piece) was another problem which had to be overcome. Strength enough to hold a real gasoline engine and permanence of finish were other factors which determined the choice of a plastic material.

All of these characteristics are embodied in the finished article. So competently was the job handled that the Modern Plastics Competition judges saw fit to give it a Top Award in the Toy Group. We have proved, we feel, our capability in handling plastics by the production of this unusual and difficult job. It is a sample of what we can do for you, in the solution of your plastics problem.

Plastics Engineering Co.

SHEBOYGAN WISCONSIN

- Let us handle your Cellulose Acetate scrap and other thermoplastic materials
- We do custom grinding (gates, lumps, etc.) assorting magnetizing
- We sell reground molding materials, solid colors, black and mixed colors, light and dark
- We buy scrap, ground or unground, and rejects (will guarantee grinding if desired)

A. BAMBERGER

Plastics Molding Materials

109 So. 5th Street BROOKLYN, N. Y.
Cable: Chemprod Phone: EV 7-3887

SELECTED DYESTUFFS AND ORGANIC PIGMENTS FOR THE COLORING OF PLASTICS

GDC

GENERAL DYESTUFF CORPORATION

435 HUDSON STREET, NEW YORK, N. Y.

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in the
PLASTICS
INDUSTRY

It's a matter of keeping eyes and ears open to new developments. Here at K & J we're keeping well informed — and well equipped to give users of plastics every advantage of our skill and experience. But even in this fast changing industry, our "Straight-Line" production has yet to be improved upon. With moulding design, mould making and finished moulding all done in the K & J plant, you are assured of a moulding service that can't be topped.

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FOR THE
PLASTIC INDUSTRY
LARGEST DOMESTIC SUPPLIERS
FOR OVER 20 YEARS
BECKER, MOORE & CO., INC.
NORTH TONAWANDA, N. Y.

● THE MUSEUM OF MODERN ART WILL SPONSOR A comprehensive competition for furniture, lighting, and textile designs as one of the first major undertakings of the new department of industrial design. The competition will be open to anyone in the United States, Cuba, Mexico, Central or South America. Entries will be judged early in December by a jury selected by the Museum. Arrangements are being made for the winning designers to receive commissions for the production of their designs and for royalties or fees instead of cash prizes. A large exhibition of the designs submitted and of the pieces produced from them is scheduled for the early fall of 1941.

● DU PONT HAS ASSIGNED "ALL RIGHT, TITLE, AND interest" in the trademark *Exlon* to the Weco Products Co. of Chicago, it was announced recently by A. E. Pitcher, General Manager of the plastics department. As a result, the company is no longer able to authorize use of the trademark by other companies to designate nylon bristles for toothbrushes and hairbrushes. These companies, he said, may appropriately refer to bristling filament produced in the future as "bristles of du Pont nylon" or "bristles of nylon, a product of du Pont chemistry," but should discontinue use of the term *Exlon*. The Weco Co., we are told, has indicated that it would give manufacturers, wholesalers, and retailers reasonable time to dispose of their present stocks of *Exlon* labeled toilet brushes.

● ANNOUNCEMENT HAS BEEN MADE OF THE REmoval of American Plastics Corp. to 225 West 34th St., New York City, Room 1715. The move was made so that the firm would be near the clothing manufacturing and trimming trades who are potential purchasers of buttons and buckles, and other items of Ameroid casein plastic.

● SINKO TOOL & MFG. CO., CHICAGO, ILL., REPORTS the appointment of Potter and Dugan, Inc., 29 Wilkeson St., Buffalo, New York, as its plastics representative in New York, Pennsylvania and Ohio. Ralph Queisser, representative of Sinko Tool & Mfg. Co., has moved his office to 621 N. Noble St., Indianapolis, Indiana.

● THREE GOLD FISH, COSTING 30 CENTS, HAVE BEEN put to work in General Electric's plastics research laboratory at Pittsfield, Mass., doing the work which took seven hours' time of a chemist each week. Since the fish find food in the work they do, the upkeep or maintenance is without one penny of cost. A large glass jar is used in the laboratory for keeping a constant temperature bath for measuring viscosity in plastic materials. The inside of this jar had a tendency to collect scum, making the glass opaque. Since it was necessary to make frequent observations of what took place in glass tubes inserted into this bath, the jar had to be emptied once or twice a week and scoured. The scum stuck, and it was a tedious job for Samuel Johnson, one of the chemists, every week. He tried different acids. They didn't work. Having seen snails in fish bowls, put there as scavengers, he tried them; but, since the temperature of the water in the jar varied, often reaching as high as 98 deg., the snails crawled from their shells and died. By chance, Johnson bought three gold fish at the "five and ten."

The fish took to the scum like a kitten takes to milk, and within two or three days the scum had all disappeared. That was three months ago, and since that time it has not been necessary to clean the bowl.

● REIN AND WEBSTER, INC., MANUFACTURER'S representatives, report the opening of offices at 1412 Keith Building, Cleveland, Ohio. Carrying a full line of die castings, plastics, rubber moldings, stampings and screw machine products, the new firm will supply manufacturers in Ohio, Pennsylvania, Indiana and Michigan. Heading the new company are Frank H. Webster, president, and John A. Rein, secretary-treasurer.

Complete Line of

Machinery for Celluloid and Plastics Mfrs.

JOHN J. CAVAGNARO

HARRISON Engineers and Machinists ESTABLISHED 1881 NEW JERSEY

Presses for Dehydrating, Filtering, Caking, Polishing, Stuffing, etc.

Mixers: Plain or stainless
Preliminary or Vacuum

PLASTIC MOLDS

Since 1918 leading molders have recognized this firm as the outstanding specialists in the manufacturing of molds for plastic materials, in die-sinking, engraving and hydraulic hobbing. (Capacity 2500 tons.)

Our plant is Keller, Gorton & Blanchard equipped for the most economical and speedy production of superior molds.

Place your problems in the hands of this experienced, well recognized and financially responsible concern.

NOCP

NEWARK DIE COMPANY, Inc.

22-24 SCOTT STREET, NEWARK, N. J.

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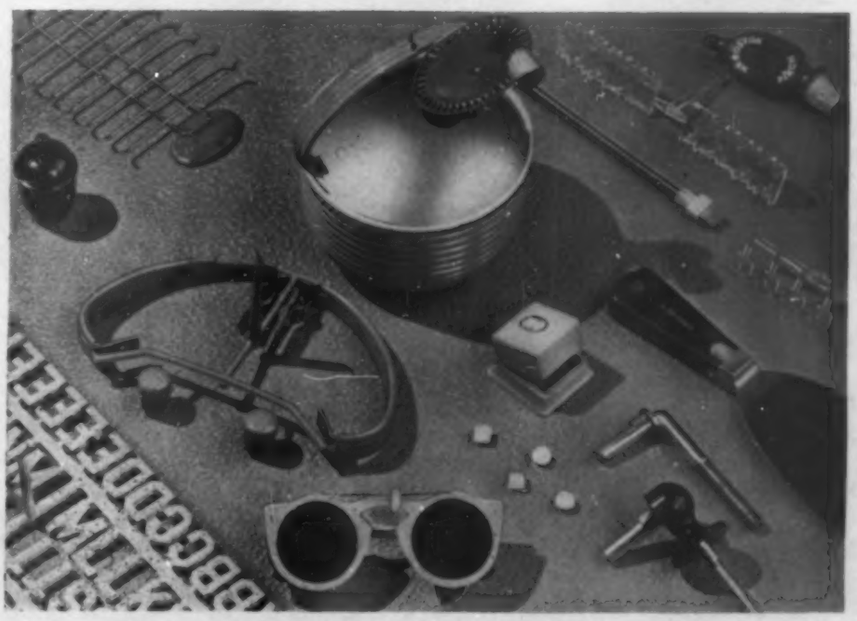
. . . now that you Mention it—



● If the unusual plastic applications pictured here suggest that we may be able to reduce production costs and step up eye-and-buy appeal for your product—let's talk it over!

We are proud to have been the moulders and mould-makers of the Scheaffer Pen Company's letter opener—an integral part of the set which won Honorable Mention in the 1940 Modern Plastics Competition.

As New England's largest plant dealing exclusively in custom injection moulding, we offer you a diversified experience in working out unusual applications for plastics. We build our own special moulding machines, maintain our own die shop and assembly department—equipment that insures quick delivery of high quality products.

Worcester Moulded Plastics Company

CUSTOM INJECTION MOULDING

2 Grafton St. Worcester, Mass.

New York Office 17 E. 42nd St.

COTTON FLOCKS?
Check CLAREMONT

For clean cotton flocks with the longest fibres ever available leading plastics producers instinctively come to Claremont.

BECAUSE:—

Our own patented machines produce flocks to specification and at a rate of speed guaranteed to meet rush requirements. . . . Our more than 24 years of service to plastics producers and our production of thousands of tons of accurate filler have proved our ability to fulfill their flocking needs.

WRITE NOW FOR A SAMPLE BATCH

CLAREMONT WASTE MFG. CO.
Claremont New Hampshire
THE COUNTRY'S LEADING MAKERS OF COTTON FLOCKS

YARWAY
HYDRAULIC VALVE

GREATER EASE AND FLEXIBILITY OF CONTROL

THE HIGHER THE PRESSURE THE TIGHTER THE VALVE

AUTOMATICALLY REGRINDS OWN SEALING SURFACES

LONG TROUBLE-FREE LIFE LOW MAINTENANCE

QUARTER CENTURY OF SUCCESSFUL USE

Made in straightway, three-way and four-way types — Write for Bulletin H-2-C

YARNALL-WARING COMPANY
106 MERMAID AVENUE PHILA., PA.

Publications

(*Continued from page 140*)

● A NEW SURVEY IS NOW AVAILABLE ON "CHEMICAL Developments Abroad, 1939" from The Chemical Division of the Department of Commerce. The momentous world events of the last year have affected the chemical industries which are closely linked with war activities. This report, which discusses the effect of munitions and preparedness on chemical production, consumption and foreign trade, was prepared largely from reports submitted by foreign offices of the Dept. of State and from official data and statistics supplied to the Dept. of Commerce by the various foreign countries. The study, which is nearly 200 pages in length, may be obtained at a cost of 20 cents per copy, either from the Superintendent of Documents, Washington, D. C., or the District Offices of the Bureau of Foreign and Domestic Commerce, which are located in most of the country's leading trade centers.

● AIRCRAFT SCREW PRODUCTS CO., INC., 25–12 41ST Ave., Long Island City, has issued their Bulletin T-1A which contains revisions and additions to their previously issued catalog on engineering standards and technical information on the Aero-Thread screw thread system.

● "THE ANSWER TO INDUSTRIAL DERMATITIS" IS the subject of a 44-page booklet just released by the Milburn Co., 905 Henry St., Detroit, Mich. It describes the various causes and means of prevention and protection against industrial skin diseases and enumerates 10 different kinds of creams and ointments for specific applications. Included in the booklet, too, is a 20-page scientific study of skin structure and composition and the underlying principles of skin injury in relation to industrial dermatitis.

● STOCK LIST NO. 1 ON COMPO POROUS BRONZE OIL-retaining bearings, in which many sizes of bearings are tabulated, supplemented by valuable information to designing engineers with regard to permissible loads, shaft clearances and installations, has been issued by Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

● A 20-PAGE BOOKLET ENTITLED, "ELECTRONIC Devices for Industry," published by General Electric Co., briefly lists some of the more important vacuum-tube apparatus and describes its application and method of operation. An idea of the scope of the little pocket-size publication can be gathered from the fact that it deals with such a variety of devices as phototubes, d.-c. motor control, the recording spectrophotometer, exposure meters, pyrometers, gas-discharge and high-vacuum electronic tubes, the Reactrol system, automatic arc-welding equipment, ignitron rectifiers, resistance welding and battery-charging equipment. Address Editorial Serv., Schenectady, N. Y.

● PRECISION SCIENTIFIC CO., 1750 NORTH SPRINGfield Avenue, Chicago, Illinois, announces publication of a twenty-four page, illustrated bulletin containing detailed specifications and performance data on a wide range of thermostatically controlled, electrically heated constant temperature laboratory equipment. Comprehensive information is included on cabinets utilizing gravity and mechanical convection heat transfer, in several types, for research, routine testing or processing.

● A NEW BULLETIN LISTING THERMOCOUPLES, THERmocouple wire, lead wire, insulators, protecting tubes and their accessories has been issued by Wheelco Instruments Co., 1929 S. Halsted St., Chicago.

THIS COMBINATION PYROMETER IS 3 INSTRUMENTS IN 1

SURFACE • NEEDLE • MOLD

Combination and Single Purpose Instruments

The Cambridge Combination Pyrometer has three separate thermocouples that may be interchanged in a few seconds. The Surface attachment indicates temperatures of still or moving rolls; the Mold attachment determines temperatures of mold cavities or other surfaces and the Needle attachment is inserted into a mass of material to indicate actual temperatures. A reliable instrument for laboratory or shop. Single purpose pyrometers also available.

Cambridge Instrument Co., Inc.
3732 Grand Central Terminal, New York City

CAMBRIDGE
Surface—Needle—Mold
PYROMETERS

Bulletin 194—S gives details of these instruments. They help save money and make better plastics.

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MERCHANDISE DISPLAY MATERIAL

FIRST PRIZE AWARD AT PACKAGING EXPOSITION

DISPLAYS THAT REALLY SELL

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INDUSTRIAL CHEMICAL CO.
11 ELKINS STREET, So. BOSTON, MASS.
PLASTIC SPECIALISTS FOR MORE THAN 25 YEARS

Ameroid
Casein Plastic of Lasting Beauty

PUNCHED FLAT SHAPES IN COLOR

Let us make your flat shapes of Ameroid, with low tool cost . . . and add the beauty of color at no extra expense. Submit your sketches or samples for quotations.

American Plastics Corp.
225 W. 34th St. New York City

MODERN FRENCH OIL Presses for Molding Modern Plastics

Winners of Modern Plastic Award Four Years Straight

● For accuracy, speed and economical operation that brings increased profits turn to French Oil Hydraulic Presses, the choice of leading plastic molders. Complete self-contained presses with automatic time control that is instantly adjustable. Dependable, modern French Oil presses in sizes up to 1500 tons are the choice of leading plastic molders. Consult French Oil engineers or write for catalog.

THE FRENCH OIL MILL MACHINERY CO.
HYDRAULIC PRESS DIVISION
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PLASTIC MOLDS
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AUTOMATIC
SEMI-AUTOMATIC
and EXTRUSION
to the LATEST METHODS
Designers and builders of all types of PLASTIC MOLDS.
Serving most of the leading molders in the country!
Our 1500-ton hydraulic Hobbing Press adds many advantages in obtaining lower mold costs.
Estimates on request.
EAGLE
TOOL & MACHINE CO.
37-39 Freeman St. Newark, N. J.
Phone: MARKET 3-1572
-1573

Plastics in Ecuador

(*Continued from page 150*)

Japan dominates the market for the cheapest grades of plastics, such as combs, hair ornaments, and toys; the better products are supplied by the United States. Many items, such as batteries, phonograph records, and automotive specialties, come almost entirely from the United States.

Import duties and consular fees—Tariff rates on those articles considered by the Ecuadoran customs as pure plastic can be obtained upon request to the Bureau's Division of Foreign Tariffs.

Invoice fees amounting to 6½ percent are collected by Ecuadoran Consuls on all shipments and a surcharge of 5 percent ad valorem on all dutiable merchandise or one percent on all articles on the free list is collected at the port of entry. Products of the United States are entitled to the tariff reductions under all trade agreements and to 30 percent reduction on items on the preferential tariff. To obtain such privileges, a certificate of origin issued by the Chamber of Commerce at the port of shipment and authenticated by an Ecuadoran consular officer, if one exists in the place, must accompany the clearance application.

Mail shipments of over $40 in value require a consular invoice.

The import control was abolished January 1, 1940, and there are no special import regulations or restrictions with regard to pyroxylin products.

Exchange—Exchange is freely available at commercial banks, at a rate which at present is the same or somewhat above that quoted by the Banco Central, which sells foreign currency for purely commercial import transactions at a pegged rate of 15 sucres to the dollar. Requests for extension of credit should not be given just because the Banco Central may not have funds on hand to supply the demand of the moment, as importers may always purchase foreign exchange in the commercial banks.

Sales methods and credit terms—Plastic articles are sold either through the medium of indent sales agents or a distributor agent who imports for his own account, depending entirely on the type of merchandise.

The principal commercial centers are Guayaquil and Quito and unless the Guayaquil agent has a branch office in Quito it is advisable that a separate agent be appointed in each of the two districts. Quito firms generally restrict their sales territory to the northern provinces and have no branch offices in Guayaquil.

Foreign collections thus far have been satisfactory although the credit restrictions of the banks have deferred foreign as well as domestic collections in a number of cases.

Many American and foreign concerns ship to reputable firms on the basis of sight draft and frequently extend short credit terms, particularly where foreign competition is strong. No definite credit policy may be recommended, however, at least for the present. With the new decree abolishing the import control, many of the smaller merchants with limited capital will probably import directly, and it is necessary that a certain caution be exercised in granting credit or in sending goods on consignments.

Language—Some of the more important firms are equipped to use English, but all correspondence and especially advertising matter should be in Spanish, if possible.

Conclusion—So far as trade between the United States and Ecuador is concerned, a marked improvement has taken place since the outbreak of the European War.

Present unfavorable factors affecting business are the stringent credit restrictions of the banks. Also, if the prediction of a poor cacao crop, the principal product of the country, is justified, it will adversely influence the purchasing power of the general public. Nevertheless, it is believed that for many plastic products, especially such commodities which are not classified as luxury articles but may be regarded as necessities, there will be a normal demand.

(A list of prospective distributor agents who might be interested in handling plastic articles may be obtained for $1.00 from the Commercial Intelligence Division, Washington, D. C.)